IN THIS ISSUE: Electrical Contracting as the West Sees It

JOURNAL OF ELECTRICITY

VOL. 44 NO. 6 SAN FRANCISCO, MARCH 15, 1920 PER COPY, 25 CENTS

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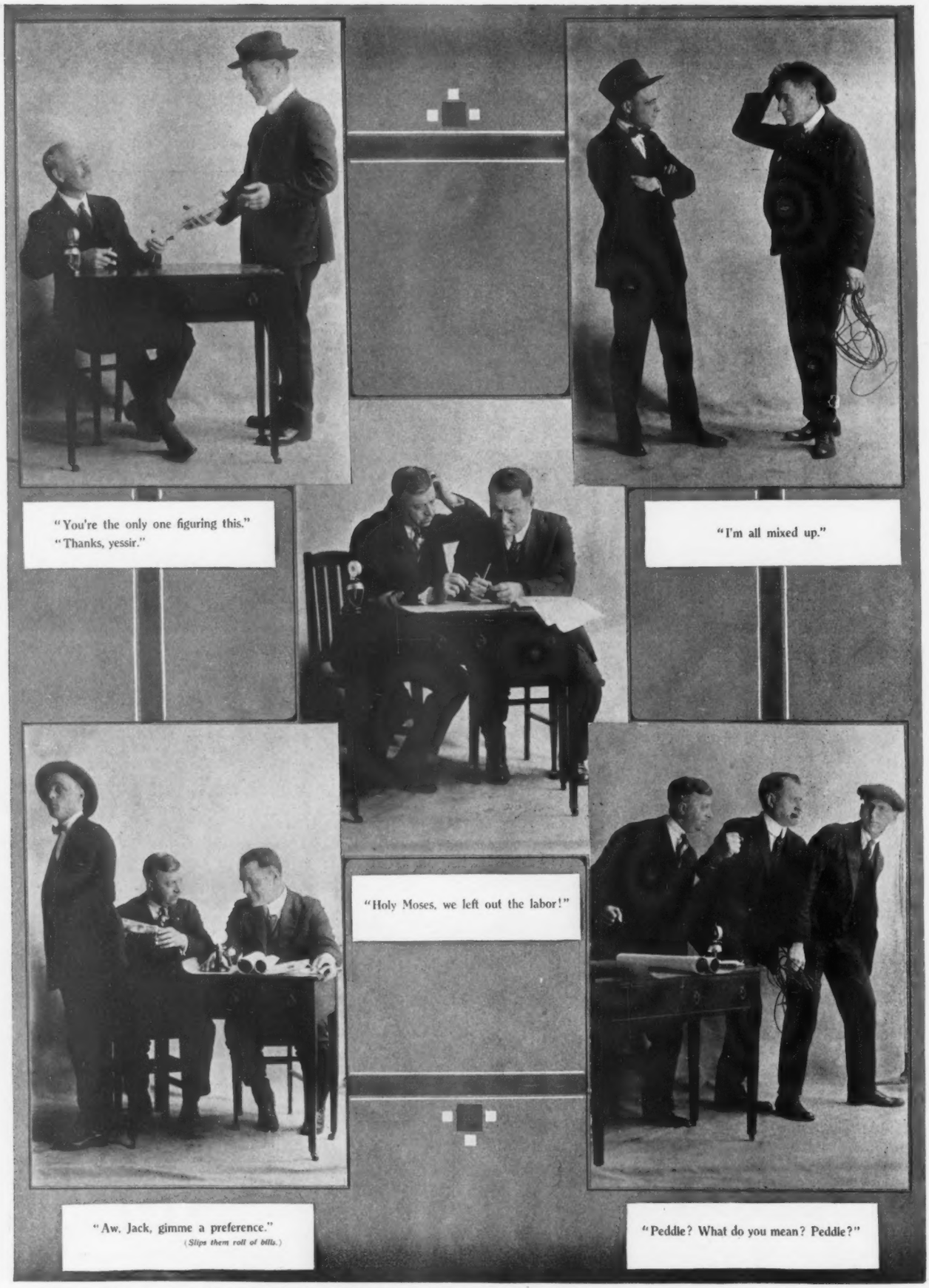
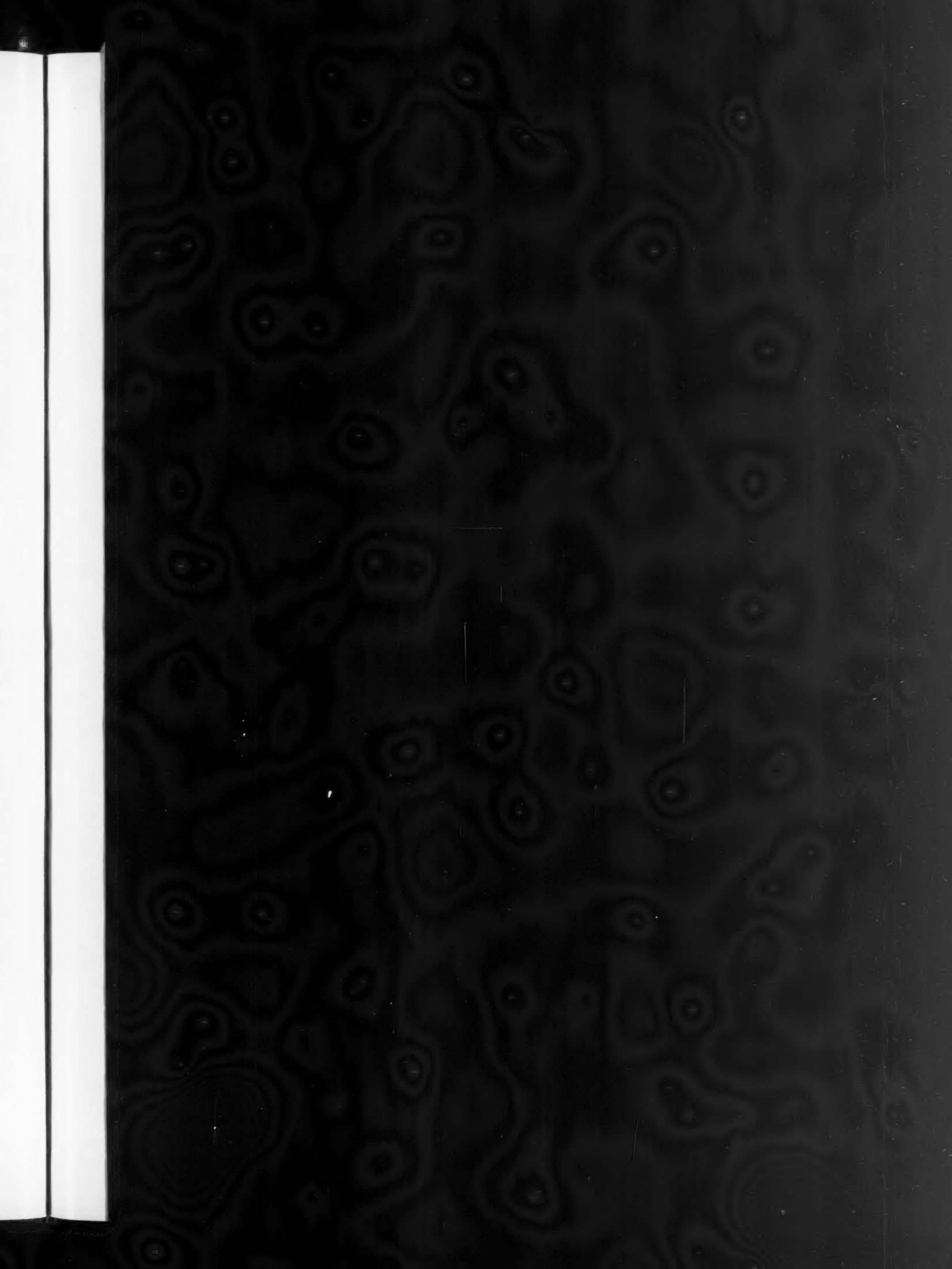

"You're the only one figuring this."
"Thanks, yessir."
"I'm all mixed up."
"Holy Moses, we left out the labor!"
"Aw, Jack, gimme a preference."
(Slips them roll of bills.)
"Peddle? What do you mean? Peddle?"

THE ELECTRICAL CONTRACTOR-DEALER of the West has made another contribution to electrical progress in this clever burlesquing of his problems. The high principles of business established by this branch of the industry are laying a foundation of sympathy and cooperation on the part of electrical interests and the public alike.



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JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 44 SAN FRANCISCO, MARCH 15, 1920 Number 6

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HOOVER AND POLITICS

Long have engineers discussed in a more or less informal manner the keen necessity of the engineering profession participating in a more effective manner in great public problems of the day. Never has there arisen in our national life a greater call for the active enlistment of citizenship in helping to solve the vast industrial and economic problems ahead than that which confronts the nation today.

Let us for a moment review some of these problems. First and foremost come the problems of transportation both on land and sea—that of the solving of our railway difficulties and of the merchant marine. Indissolubly connected with these two problems are those of labor and capital in the wake of which must always follow the problem of financing which today, due to the depleted store of the world's supply of moneys, must each day become more and more acute.

It is difficult for us to look about and find embodied in a single personage one who has the distinct characteristics for the office of Chief Executive to a higher degree than has Herbert Hoover. Indeed, it is questionable if in all history there has appeared a man so modest in presumption and yet at the same time so fitted for this great and important need of the hour. No more vital problem arises in industry than the economic supply of raw materials. As one who has participated in the production of metals, it is doubtful if there has ever been one so conversant on a broad international scale in the mining engineering profession and in the economic production of metals as is Herbert Hoover. In regard to food supplies, both at home, in foreign countries and in the enemy countries of Europe, he occupies a peculiar and sympathetic place in the hearts and minds of these peoples, while immediately upon cessation of military operations in Europe he became the railway administrator and executive of a vast system of railways throughout Europe in both friendly and enemy countries—a position marking him as unique in the annals of railway rehabilitation. Today the United States of America is the greatest industrial corporation in the world. There is need of having in our Chief Executive a man well familiar with the practice of handling great units of industrial activity and one who possesses a sound, sane business judgment.

While Herbert Hoover has made it well evident to all that no one today is authorized to speak for him, it is clear from his recent utterances that he is opposed to socialism, that he believes in private ownership, that he believes in the development of individual stimulus, and that above all he is a broad, sympathetic American in his viewpoint both to his own country and to the world at large.

Engineers today throughout the nation, after reviewing the peculiar fitness of this man Hoover for the office of Chief Executive, are answering by the thousands the call to service in enlistments of supporters from every quarter in behalf of his election to the Presidency of the United States of America, not because Herbert Hoover happens to be an engineer but because they see in him the man of the hour for this position. Six weeks ago the Journal of Electricity, by frontispiece and leading editorial, came out in no uncertain words in endorsement of Herbert Hoover for President. From practically every quarter of the West has come a unanimous endorsement of this action. To his election to the Presidency of the United States of America, this journal shall devote its activities during the coming months, and we bespeak a cordial and friendly greeting in his behalf throughout the vast Empire of the West and ask our citizens that his name be given the most careful and earnest consideration.

Good Insulators

Frequently is heard the statement, usually from an insulator manufacturer, that the insulator problem is solved; that all former designs are to be junked. In such instances stress is laid on design. To be sure there have been great strides taken in design improvements, both electrically and mechanically—but, to the operating engineer, a **good** insulator means only one thing: an insulator which will last under the intended service.

A recently concluded megger test of eleven thousand suspension units, in service on a high voltage line, disclosed only three bad units—this after something over two years' service. It is admitted that neither the test by megger nor the results of only two years' service are decisive in themselves, yet other evidence which is available seems to add the weight of certainty to the conclusion that the answer to the insulator problem is known. These additional facts are that these particular insulators were of one standard, while others of equal length and condition of service but manufactured by a dif-

Christopher Columbus got there after many trials—do not let anything interfere with your getting to convention ——

———————— PASADENA — MAY 17-21, 1920

ferent (if not lower) standard, did not give nearly as good results under the same test. Attention is drawn to the use of the term **lower standard.** In the two cases the same specifications were given the manufacturers, the same factory tests were applied, and the same field handling given; yet there was a known difference in the product.

The answer is simple: plain, ordinary, honest work in the factory can produce suspension insulators as reliable and satisfactory as the smaller and better standardized pin types. Insulators as taken from the kiln can be visually inspected, can be given all the usual electrical tests and yet be poor insulators, due to porosity or granulation. This may be discovered by breaking the insulators and examining the internal structure; or by an intimate knowledge of the history of the batch from the time of mixing to removal from the kiln, in addition to the surface appearance after glazing.

Generally, the only problem involved is the selection of the proper material as it comes from the kiln. The processing of the material before it is fired is important, but it can be controlled and the range of suitability is quite wide. Uniformity of firing, however, is impossible, and since a kiln will contain a product of a wide range of vitrification, the question of insulator manufacture will depend upon the reliability of selection of the desirable units to place on the market.

Newspapers and "Free Energy"

Periodically the discovery of some new form of energy which will "revolutionize" the industry of the world is heralded by the easy-believing American press. Usually the newspapers proclaim in "scare heads" the achievement of some unknown investigator, who has "stumbled upon" reservoirs of power hitherto unguessed of by science. Reminiscent of the generous publicity accorded during the war to ill-fated Garabed, are the recent newspaper accounts of a new method of obtaining electrical energy claimed as the discovery of a nineteen-year-old Seattle youth, Alfred M. Hubbard. The device purported "to capture the illimitable power of the universe," as the fervid journalistic diction put it; and it has, according to its originator, no moving parts connected with it nor any batteries, storage or primary. Under plea that his patent rights might be infringed, the youthful experimentor has been averse to close examination of the contrivance by qualified electrical engineers.

Whether or not this "Atmosphere Power Generator" will prove as little founded on sound scientific principles as Garabed, it behooves the daily press to be conservative in its pronouncements. Newspapers have a definite duty to the public in industrial affairs, no less than to industrial interests which are themselves mainstays of the press. Frequent announcements of "revolutionary" power-generating devices are not conducive to public confidence in the securities of electrical industries; and it would be well for the daily journals to investigate fully, as the technical press seeks always to do, before giving wide publicity to matter which may affect unfavorably the interests of important elements in our industrial life.

According to the Seattle "Post-Intelligencer," Hubbard says his generator "will junk every steam and gas engine in the world; it will place electricity in every home without cost for current; it will do away with all the present cumbersome methods of electrical production with their generators, transformers and transmission lines." What is the effect of columns of such claims placed in alluring fashion before the public eye? If they are reiterated often, the confidence of the investor in stocks and bonds of electrical corporations is bound to be shaken. The insidious suggestion, oft-repeated, that after all some new method may come along and suddenly sweep away the fabric which the electrical industry has been years upbuilding, is likely to sway the judgment of many a man who may have money to invest.

So, we say, enough of this talk of mysterious new power principles "making necessary the scrapping of enormous values in present-day power machines, wiping out industries that have every evidence of permanency"—to quote a recent editorial utterance on this latest device. Let proper investigation first be made by qualified specialists before announcement is made broadcast of such extravagant claims. Thousands will laugh, and will not take them seriously; yet thousands unquestionably will —and the newspapers must accord due protection to important industries whose progress forms part of the common prosperity, their own included.

Deepening of Western Harbors

The various shipbuilding accomplishments of the last two years on the Pacific Coast, wherein the best of Eastern achievements were outdone, have called attention to this section of the country as a possibility for this line of enterprise. It is gratifying to note, too, that the eyes of the commercial world are more and more being directed to the Pan-Pacific area and the possibilities of Pacific Coast cities in commercial development of the future. It is, as a consequence, with an unusual sense of satisfaction that we view the activities that are at present looking to the deepening of Western harbors for increasing future shipping facilities. It has developed in recent months that the entrance to San Francisco Bay in natural depth of channel is exceeded by only one other harbor in the United States—that of York, Virginia. It is true that New York harbor and Norfolk and one or two others are today of greater depth. However, this depth has been acquired by artificial means. The depth of the channel under all conditions through the Golden Gate is something in the neighborhood of thirty feet. That the depth of this harbor should be artificially constructed to carry 40 ft. clearance is a question that should receive the careful consideration and attention of Congress at an early date. Possessing already, by nature, the second best depth of harbor in the country, artificial

deepening seems justified and advisable from every viewpoint. It is to be hoped, then, that considerable interest will be aroused in undertakings of this nature so that the great port facilities of the West may be presented to the commercial world at large without a peer in the enterprise of the world.

Auxiliary Steam Plants Valuable in the West

The immense value of auxiliary steam plants to power companies, even in a country with great water power resources, is now being exemplified in the West. Not only has the present year so far proved very dry, with only light rainfall over most of the district beyond the Rockies, but the past three winter seasons have been little better. In California, for instance, until quite recently all the Sierra streams were low; the Stanislaus river, for example, is reported to have been lower than ever in its recorded history. The recent rains will do much to help the power situation, yet the stores of water in most of the reservoirs are much depleted, and the power companies have turned to their steam plants to keep the generation of power up to the required amount. Normally these plants produce about one-quarter of all electric power used in California; but at the end of November they were said to be turning out fully one-half of the total current generated. Many of the steam plants were being forced, with a consequent wastage of fuel and an increased cost of production.

No doubt is expressed as to the adequacy of the precipitation in California and the West this year to serve the needs of the hydroelectric stations. The wet season is later than usual, but this is not necessarily an indication of a dry year. Nevertheless, power companies are paying proper attention to the development of their steam plant equipment, in order to keep pace with the increasing demands of Western homes and industries, which must be permanently assured of dependable service.

New Industrial Lighting Codes

Several of the states have issued, or are preparing to issue, new industrial lighting safety codes, indicating an awakening of interest in proper factory illumination all over the country. California has recently put into effect an up-to-date code which is being pointed to as a model in many features. While it will undoubtedly result in a quite general readjustment of industrial lighting arrangements, it is unlikely that it will work hardship on building owners or employers, as the orders only require the minimum intensities. The restrictions as to glare and the distribution of light aim to protect workers to a reasonable extent. Of course, a much greater amount of light than that provided for would be necessary to insure maximum production, but nevertheless a raised general standard of illumination and a perceptible increase in manufacturing efficiency should soon be apparent. Good lighting, as a recent survey of industrials in Chicago showed, increases production approximately 15%, at an added cost of but 1% to 6% of merely the labor cost.

The excellent manner in which the California Code has been drawn bespeaks for it the earnest consideration and attention of all well-wishers of the industry.

Uncalled-For Rates at Hotels

The subject of hotel rates is one of the greatest delicacy. In the West where hotels have done such wonderful things in advertising the resources and possibilities of this vast district, little criticism has in former years been heard relative to the rates charged Eastern visitors. It has been called to the attention of the Journal of Electricity that this season is experiencing unusual numbers of visitors from the East. The consequence is that hotels, both far and near, are loaded to the limit. In some localities, even the lobbies are being made use of to accommodate those who are not fortunate enough to secure night lodging upon arrival in the various cities of the West. It is difficult to foresee such a situation as this, so there is little to blame due to the fact that hotel accommodations are insufficient to take care of the great demands that are being made upon them in the various sections of the West. There is, however, a grave responsibility that rests upon all to see to it that these Eastern visitors and tourists be given a square deal and reasonable attention to carry them through the present critical and over-crowded situation. That some of the hotels in well-known tourist districts are this year charging exorbitant and unheard-of prices is a subject of serious public concern and it would be well that men of the electrical industry, both far and near, protest with no uncertain emphasis against the undue charges that are being made in instances where hotels have become overcrowded. It is hard indeed to pen these lines in criticism against certain of our hotels that have done such wonderful things in the past to set forth the wonders and possibilities of the great undeveloped West. And yet, for permanent growth of this section, we must see to it that a square deal and fair play be the fundamental principles upon which the growth of the West must continue.

New System of Valuation Needed

At the present time with most of the power companies applying to the Public Service Commissions for permission to increase rates due to the increased cost of production, the question of present day valuation of physical properties comes again into the limelight. If the electrical industry is to be developed to its utmost and large amounts of money spent in new construction, then it is only just to allow a fair return on the money thus spent. Many well-known authorities on rate fixing agree that the present value of a concern is the value of all its property, tangible and intangible at the time of the investigation. If the

It is important to remember your wife's birthday—but there is nothing more important to the electrical industry of the West than this year's conventions ——

—————— PASADENA — MAY 17-21, 1920

costs of labor and material are higher at the time of the inquiry than those prevailing at the time the property was constructed the reproduction cost would be greater and consequently the value of its tangible properties would be proportionally higher. Any other position would result in taking the property of the utility without just compensation because the purchasing power of each dollar of its net return would have decreased in the same ratio that labor and material had increased. So the same values that would hold in a condemnation proceeding against a utility should be allowed in a case where the value of that utility is to be used in the determination of the rates it is to be allowed to charge. There is no doubt that the present system is unwieldy.

Fluctuating prices are to be anticipated for years to come. On another page of this issue C. E. Grunsky has offered an interesting analysis that merits the attention of executives of utilities and those who sit upon the benches at commission hearings.

While it may be taking too big a step all at once to allow a rate on present installations agreeable to present day costs, still each day brings more forcefully to mind that reproduction of installation is actually taking place and perforce at the present high prices. Hence it must readily be acknowledged, whether we like it or not, that if these prices continue over a period of from ten to fifteen years, complete replacement will have been undergone and then the situation will have to be admitted.

American Institute of Electrical Engineers

"If you have a dollar and I have a dollar, and we trade dollars, we each still have a dollar. But if you have an idea and I have an idea and we trade ideas, we each have two ideas." That statement applies with the greatest force to the meetings and conventions of the American Institute of Electrical Engineers. That organization does not exist for the members to meet for the purpose of making money from each other, or from outside persons or organizations, but it has for its purpose the transference of knowledge. When prospective members are acquainted with this fact and the employers of members more fully appreciate it, greater good will come from the Institute. As knowledge is power, that employer who sees to it that his employes have the fullest opportunity to acquire knowledge, will progress. And those engineers—and potential engineers—who see that the greatest advancement to themselves comes through knowledge, will hasten to promote the welfare of the Institute.

A Forum for the Entire Industry

The meeting of the Conference Club which was held in New York two or three weeks ago was an event of importance for the electrical industry in all parts of the United States. The idea was there formulated for the extending of the scope of this Conference Club, hitherto a discussion ground merely for the contractor-dealer, to a forum for the entire electrical industry, where representatives from every branch and from every part of the country may discuss matters of public policy and intergroup relationships. It is the intention that this shall be an advisory rather than a directing body — merely a place for clarifying thought in the interest, first, of the public; next of the industry as a whole; third of the various branches of the industry as entities, and finally, in the interest of the companies of the individuals engaged in this business.

This tendency toward cooperation which has become such an intrinsic part of the electrical industry is the strongest element in its present position. From the inception of the various movements—the Goodwin Plan as a national idea, and the California Electrical Cooperative Campaign as a practical working unit—the cooperative idea has grown and has strengthened the industry within itself and greatly bettered its relationships with the public. The present organization is a recognition that straight thinking solves most ills. The movement is one of the utmost significance to the electrical industry and one in which, although it centers on the other side of the continent, the West should make the effort to bear an active part.

INDUSTRIAL USES OF ELECTRICITY ON THE PACIFIC COAST

—A collection of articles bringing out the development of Western industry and the consequent advances in the use of electricity

WESTERN RAILWAY ELECTRIFICATION

—Presenting the most recent progress on the Chicago, Milwaukee & St. Paul Railroad in the electrification of the coast section.

TELEPHONING FROM THE AIR

—By Roy J. Heffner. An authoritative article on radio telephone equipment as developed for aeroplanes during the war.

MAKING A SUCCESS OF ELECTRICAL RETAILING

—Some of the merchandising features of a progressive electrical establishment on the Pacific Coast, and the ways in which they promote successful business.

Electrical Contracting 500 B. C.

BY L. R. ARDOUIN

(This play was originally produced by prominent electrical contractor-dealers at a meeting of the San Francisco Electrical Development League under the title "Take the Offlmug Apartments F'rinstance, or 500 B.C." As an entertaining but forceful burlesque of cut-throat contracting, it is significant of the new spirit of integrity which is arising in industrial circles.—The Editor.)

ORIGINAL CAST

U. Goatell, Architect.....C. J. NEWBERY
I. Skinnem, General Contractor.....C. F. BUTTE
U. Soakem, Skinnem's partner.....C. B. KENNEY
Slashem Beatem, Electrical Contractor.....C. L. CHAMBLIN
Cuttem Sharp, same species.....E. E. BROWNE
Hackem Slick, another criminal.....PERCY SCHWARTZ

SCENE 1

The Architect's Office

[U. Goatell is seen at table poring over plans. Skinnem enters.]

Skinnem: Hello!

Goatell: Hello!

Skinnem: What's new? Got anything on the boards?

Goatell: Yeh, just finishing a plan for the Offlmug Apartments on Punk Street. Some job!

"Let's see where we made the mistake that gave us the job."

Skinnem: How's chances to figure them?

Goatell: Fine, if you give me a decent figure. I really believe that you made a profit on that last job—that Goofle residence.

Skinnem: Well, I admit I made two dollars a day and worked myself. But you can't call that unfair.

Goatell: Now, lissen. We won't talk about that. I want you to figure this right. You gotta give me a decent figure or you don't figure any more plans in this office. Just to show you that I'm a good sport, I'll give these plans only to you. I have only one set. These are the originals. If you'll give me a right price, we'll go right ahead with the job.

Skinnem: Yessir. [Exit.]

[After Skinnem goes out, the Architect calls up general contractors and tells them to come in for plans, that they are the only ones on the job, and so on.]

SCENE 2

Office of Skinnem and Soakum

[Soakem seen seated at desk, smoking; feet upon desk. Enter Skinnem in a hustle.]

Skinnem: Got a job, got a job! We're the only ones figuring it. Here's where I get back at that U. Goatell for being so strict on that Goofle residence. I actually had to put in everything the plans and specifications called for, on that job.

[Soakum is not perturbed. Raises his eyebrows.]

Skinnem: Well, let's get down to business. He wants that figure in by tomorrow at 12 o'clock.

Soakum: All right, where'll we start?

Skinnem: Let's figure the extras first.

Soakum: Now listen, my son. Haven't I taught you what a general contractor should know? He is supposed to know a lot. Supposed to, get me? It's the simplest thing in the world, to figure a job. All you gotta do is get the bids from the material men and sub-contractors, put them in columns tabulated, add 'em up correctly, and put on something for labor and maybe profit, and then watch the other contractors and try to get a line on their bids. It's the same all the way down the line with the contractors.

Skinnem: Well, we're the only one on this job.

Soakum: Yes, I know; but we gotta watch out just the same.

Skinnem: Well, I'll lay out the carpenter work, and the bricklaying. That's all I know how to do. You go ahead and rustle up some of these sub-contractors.

Soakum: I think I'll start on the Electrical Contractors first.

[Soakum proceeds to call up several electrical contractors: "Gimme a good price, now. None of that high-faluting stuff." Soakum goes on with the usual "line." Then the two have a good time telling each other "what fools these sub-contractors be."]

SCENE 3

Street Scene

[Cuttem and Slashem enter and meet. They are very, very cordial.]

Slashem: Hello, Cuttem.

Cuttem: Hello, Slashem.

[Usual line of preliminaries.]

Cuttem: Hear you got the Dingbat residence. Betcha didn't get 25 and 20.

Slashem: Sure I did, but I threw in the fixtures.

Cuttem: Well, I stayed off that job for you. Now I want you to do me a favor.

Slashem: Sure, you know me.

Cuttem: Yeh, I know you too doggone well. Well, what I was talking about was this: there is a job out here on Punk Street—apartments out of Goatell's office. Now you know I have the inside there. He never lets any of his work to anyone but me. He used to flirt with my wife, and we have known each other for years. We're old pals. Why, yesterday he says to me, "Ike, you're a wonderfellow; I wouldn't have any of those cheap skinners around my office like Bunk." Now this contractor, I do all his work, see? So, if they ask you for a figure, bid high and I'll buy you a nice cigar.

Slashem: Sure. [Cuttem goes out.]

[Hackem enters and exchanges greetings with Slashem. Extremely friendly.]

The small boy who puts a board in his trousers is prepared for emergencies—are you prepared for the visitors who will visit the coast after convention? ——

—————— PASADENA — MAY 17-21, 1920

Slashem: How's business?

Hackem: Rotten. I'm all mixed up.

Slashem: What's the matter?

Hackem: I can't tell how much I've made. Don't know where I'm going to; bills coming in, and I have to scramble to meet the payroll.

Slashem: Don't you keep any books?

Hackem: No, what's the use? I'd only have to employ some one to take care of 'em. I haven't got time to take care of them myself. I got enough to do—sweep out the place in the morning, get the men started, answer the telephone, take material out on the job, put in forty or fifty outlets a day during my spare time. Whaddy think I'm in business for? I can't be bothered with spending money for a bookkeeper's salary. I got enough expenses. Keeping books adds to the cost of my jobs and cuts down my profits. Keeping books is an expensive luxury. Ask any general contrator, if you don't believe me. When I got more money in the bank this time next year than I have this year, I know I've made money. Isn't that enough? This year I had $1500 more on January 1st than I had on January 1st last year.

Slashem: Yeh, but your rich uncle died and left you five thou in the middle of last year.

Hackem: Sure, and I have another that will probably drop off next year. Well, I gotta hurry along. I'll make some profit somehow. But I am not going to let any of these birds take a job away from me, even if I have to do it for nothing. But you're my friend. I want to thank you for staying off that last job for me. I made five per cent gross on that. Some profit!

Slashem: Oh, that's all right, you needn't thank me. I want you to stay off one for me now, will you?

Hackem: It depends. What is it?

Slashem: The Offlmug Apartments, out of Goatell's office.

Hackem: Ask me something easy. I have the plans in my office right now.

Slashem: Yes, but you haven't got a chance. I'll get that job $100 preference over you. I am the only one in, in that office. You oughta know that. Goatell lets me meet every figure.

Hackem: Well, I hate to lay off after I've spent all this time figuring on it. Tell you what I'll do. I'll play you a game of poker for it.

Slashem [deeply offended]: Where do you get that stuff? Well, you'll want me to do something for you some day.

[By continuation of this sort of converse, he finally coaxes Hackem to "lay off." They go out arm-in-arm.]

SCENE 4

Office of Slashem Beatem

[Slashem at his desk. Has set of plans in front of him. He soliloquizes.]

Slashem: Well, I had a hard time to get these. So these birds think they have a chance on this job. Ha! ha! Well, I've fixed that guy, Hackem; and Cuttem thinks I'm going to protect him. Now I'll cut out the switches and put them back to back like Bunk does. [Phone rings.] Hello. Yes, this is the Junk Electric Company. Yes, this is Shimmy talking. What, you want me to figure a house? I'm pretty busy just now . . . You want it right away? What kind of a house is it? Cottage? . . . Yes . . . How long? [Writes everything down] How wide? 20 feet? How long? 50 feet. Yeh. How many rooms? Let's see . . Just a minute. [Figures frantically.] Well, I'll do it for you for $100. [Picks up paper he has been doing all figuring on and throws it in waste wasket.] But, gee-whiz, I forgot all about the Department of Electricity. Since that new guy got in there a fellow is up against it.

SCENE 5

Office of Skinnem and Soakum

[Enter both Skinnem and Soakum.]

Skinnem: Well, we're lucky boys. We beat out the nearest man to us by $2000 on a $5000 job. That's the way to show 'em how to figger. Isn't that so, Dave?

Soakum: Sure; let's look over the contract we signed. My rule is never to read a thing until I sign it.

[Reads.]

"All work that should have been described in the specifications and which is not shown on the drawings is to be executed in a workmanlike manner and furnished by the contractor without cost to the owner.

"If at any time during the construction of the building, the work should be ordered stopped by the architect, the contractor agrees to turn over to the owner all work already installed without compensation.

"If the contractor finds it necessary to move the adjacent property to make the plans fit the job, this contractor shall move such property.

"Now you know I have the inside there."

"Can you beat that?"

"Ask me something easy. I have the plans in my office right now."

"This contractor shall furnish bond in the amount of fifty per cent of contract price, mortgaged real estate with first and second mortgages preferred.

"This contractor shall furnish the necessary lumber, nails, and carpenters with saws and hammers, to perform the work called for in the specifications and plans.

"All building laws, ordinances, state rules and regulations, fees and permits, that conflict with the plans and specifications shall be disregarded.

"The owner and architect will take care of the necessary formality to have the authorities approve any such work.

"This contractor shall complete the work within 759 days. If work is completed prior to this time, the contractor shall be penalized in the sum of one hundred dollars ($100.00) per day."

Skinnem: Now let's look over the plans and see where we get started.

[Phone rings.]

Soakum: Hello. Yes, this is Skinnem and Soakum. Yes, Mrs. Offlmug, we were awarded the contract. Yes, ma'am, we'll be out there to start work the first thing in the morning. No, ma'am, it will be impossible for us to have the roof on in two days. Yes'm, yes'm, yes'm. [She doesn't give him a chance to talk. He hangs up the receiver exhausted.]

Skinnem: If this is the woman we have to work for, we are out of luck.

Soakum: Let's look over these plans and see where we made the mistake that gave us the job.

[They look. Dig up estimate after a great deal of trouble; locate it on a business card.]

Soakum: Holy Moses, we've left out the labor!

Skinnem: And we forgot to figure the roof.

Soakum: But think of our extras.

Skinnem: Well, we have to get busy. Let's start on the electrical contract. One of those birds told me material was going up and his figure would only hold for a day. Those electricians are fish, anyway; we can get them down to where we want them. [Phone rings again.] Yes, this is Skinnem and Soakum. Who? Oh, yes, the Spoofem Electric Company. Say! Where did you learn how to figure? All I asked you for was a figure on the work for the Offlmug Apartments. You must have got mixed and were seeing double that day. This is after July first, remember. You're too high, I tell you. Oh, I won't tell you how much. But you're high. Sure, I'd like to have you do the work. Didn't I tell you that before we started? Way high. What's that? What? Cut? Well, come up and see me in half an hour. [Rings off.] Ha, ha! That was Cuttem; he's easy. [Phone rings once more.] Skinnem and Soakum. Yeh, yeh, the Wrex Company. Yeh, we received your bid, but we didn't ask you for any. Yeh. Say, I think you made a mistake. I only wanted a bid on the work of the Offlmug Apartments, 20 rooms. I think your bid must have been the one you used on the Palace Hotel. What? You will shade it? How much? Sure I'd like to have you do the work. Didn't I tell you that before we started? Well, even if you do that, it'll still leave you high. All right, if you want to do business, call around in half an hour. [Hangs up receiver.] Well, well, they're coming fine.

[Once more the phone rings.]

Skinnem: Yeh, yeh, yeh, yeh, yeh! NO, I should say not. I didn't ask you for the price of your business. I don't want to be your partner. All I wanted was a bid for the electrical work for the Offlmug Apartments. With a bid like you got, you could make a try for the general contract. What! Come right up. [Rings off.] There's Hackem. He'll cut, I know. [Cuttem enters, very much in a hurry and greatly perturbed.] Well, what do you want?

Cuttem: I called you up a few minutes ago. You said I was high.

Skinnem: Yes, the highest one in the bunch. Where did you learn to figure?

Cuttem: Well, how high?

Skinnem: High enough. So high we hate to tell you how high you really are. Now, we want you to do this work. You've done a lot of work for us, but you know that $100 is $100.

Cuttem: I'm not that high, am I?

Skinnem: Yes, and more.

Cuttem [astonished]: Well, I must have made a mistake. Let's see my bid.

Soakum: You remember what your figures are. That's enough. If you can't quote us a reasonable price, I don't know what we're going to do.

Cuttem: Well, how high am I?

[They keep silent. He makes so many demands finally Skinnem replies.]

"Haw! haw! That was the painting and decorating figures I gave him."

Skinnem: I'll tell you what I'll do. Here are some figures. Can you beat them?

[Shows him some letters, being very careful to turn over letterheads, making much ado about this business.]

There, what do you think of them?

[He will not allow Cuttem to touch them; only look.]

Cuttem [to himself]: I recognize the handwriting of that typewriter. I'll be condemned if that guy can beat me. He'll never get that job away from me. I'll show him who's doing the figuring here.

[Business of taking pencil and paper, and figuring in notebook, much concerned. Finally writes down figure on piece of paper and shows it to them.]

How's that?

Soakum: That's more like it. Why don't you fellows come down to earth?

The young man went because she promised to be a brother to him—you will want to go because it means contact with all the big men of the industry ——

——— PASADENA — MAY 17-21, 1920

Cuttem: Well, let's sign up the job.

Soakum: You wait just a minute. We have a lot of things to go over just now. We're busy. We'll call you up.

[They "stall him off" and send him away without signing.]

Skinnem: Haw, haw! The poor boob! That was the painting and decorating figures I showed him. They all fall for that stuff. We'll get this job down to where we can make some money yet.

[Enter Hackem.]

Hackem: I'm here to see you about that bid of mine on the electrical work for that job I called you up about. You said something about my being rather high.

Skinnem: Rather? I should say that you were rather high. You're so high we have to get a step-ladder to see your price. You must have gone off your head. You ought to be shamed to show your face in a decent contractor's office with a bid like that. Where do you get that stuff? Come down to earth. You make me——

Hackem [interrupting the tirade]: Well, let's get together on it. Maybe we can do something

[Business of same "stalling" again. Business of showing bid with letterhead turned down.]

Hackem [after seeing bid]: I'll never let that double-crossing crook beat me out of any job.

[Figures hurriedly. Usual business of cutting. Makes a good cut.]

Soakum: Well, that's a fair cut; but you are still away high.

[Hackem forthwith gets angry and gives a rattling sales talk. Price, quality, service; knocks every one else, has special look-in on material market; guarantees everything, and so on. Tries to sign them up.]

Soakum [after Hackem has finished]: That's all very fine, but you gotta talk to our pocketbooks, and you'll have to dig their ears out with a pencil. Get me?

Hackem: That's as low as I can cut. I'm losing money to do that job now. [Becomes angry.] What are you fellows doing—trying to peddle my bids?

Skinnem: Peddle? Whadyuh mean peddle? Get out of here!

[They throw him out, amid much clamor.]

Skinnem [after sitting down]: He's hopeless. He only cut off $50. Don't worry, we'll get them down to where we want them yet. There's another one to show up.

[Telephone rings.]

Soakum: Yes, Mrs. Offlmug. Yes'm, we'll surely be out there in the morning. Oh, yes, we have built houses before. Oh, yes, yes, yes, we'll be sure to do that. Oh, yes. [Hangs up receiver exhausted.]

[Enter Slashem.]

Slashem: Did you want to see me about my bid?

Soakum: You mean, did you want to see US? Now, look here, Dave: you're a good friend of mine, and I want you to do this job, but $150 is $150. Just to show you what an inside you have in this office, I'm going to do something for you to prove my friendship. This is something I never did for anybody else, and I wouldn't do it otherwise. This is one, just one, of the electrical bids that is lower than yours. I'd like to have you do the job. I'd even give you a preference.

[Shows him bid.]

Slashem [showing surprise]: Where did that price come from? Well, I'll tell you, Jack, we have an Association, and if any of those fellows caught me cutting prices I'd get an awful bawling out. I don't see how I can cut. I see he's $600 under me. I couldn't cut that much. Now, lissen, ain't I worth $600 to you? You know I've done some big work, Jack. Remember, I got the Umpty-Ump job on a preference over six others. I've put in some of the biggest work in this city. These other birds have only been in business six months. I think that ought to be worth something. All these birds used to work for me. C'mon, Jack, this ought to be worth something to you.

Skinnem: Yes, but we're taking this on a narrow margin ourselves. If you are such a good friend of ours, why don't you cut something off for old friendship's sake?

Hackem: Well, I'm only above him about $600.

Soakum: Yes, but he's offered to put in a lot of things that are not included in the contract. He's offered to wire those flats I own out on Blimp Street for nothing, and is throwing in the fixtures besides.

[Hackem, scratching head, wonders. Bright idea seizes him. Deliberately takes a roll of bills from his pocket, straightens them out, counts them carefully with back turned to them, but facing the audience. Holds them straightened out behind his back. Puts other hand in pocket and jingles dollars. Walks around the room.]

Hackem: Aw, Jack, gimme a preference. Nice little preference. Dear old preference. You know me, Jack. I want to tell the boys I got a preference.

[Finally they take the roll, sign him up hurriedly, and he walks out with contract signed.]

Skinnem: Well, that's not so bad. [Counts coin.] Here's $300; and he'll do everything the other fellow will do.

Soakum: There's no use putting that on the books. We can just as well split it now.

Skinnem [doing so]: Well, let's go out and get lunch with the morning's profits. [They go out.]

SCENE 8

Office of Skinnem and Soakum

[Two months have elapsed, and the job is about completed. Skinnem and Soakum enter, dejectedly.]

Skinnem: That woman is driving me crazy. It's not enough for her to camp on the job all the time, chattering like a fool, but she has her husband there during lunch hours and is at me all the time to put in extras and everything. I don't see where we're going to get off.

[Phone rings. They are tragically seized with fear. They cling to each other. They try to make each other answer it. Business of "I answered it last time. It's your turn now." Finally they flip a coin. The ghastly lot falls to Soakum.]

Soakum [answering phone]: Yes'm, this is Mr. Soakum. Oh, yes'm. Yes, indeed, we'll do that. Yes'm; yes'm. [Rings off.]

Skinnem: Let's get out of here so's we can talk things over.

Soakum: Oh, I don't think she'll call up any more.

[Phone rings.]

Good Lord, is that her again? Well, it's your turn now

Skinnem [takes up instrument with utter resignation] Yes, Mrs. Offlmug, this is Skinnem and Soakum. Who. [His face brightens.] Oh, excuse me, Mr. Goatell, I thought it was that pest client of yours. She's been making my life a burden ever since we started that job. What? You want us to come over for our final payment. Yes, sir, I'll be right over.

[Rings off. Turns to Soakum jubilantly.]

H'ray, he has our 25 per cent over there waiting for us. The last one on the job. [Rushes out.]

[Soakum seizes phone; calls up local people. Buys goodly store of "private stock." Makes reservation on evening train out of city.]

[Phone rings yet again.]

Soakum [answering]: Hello. Yes. Oh, yes, Junk Electric Company. You want some money? Say, why are you always pestering us for your dough? You know you'll get it. Haven't you always gotten it? I tell you we haven't received our estimate from the owner. Don't get rough or you'll have to wait a longer time. [Hangs up quickly.]

[In rushes Skinnem with a wad of money.]

Skinnem: Well, we have it. Here it is. Now we can do what we want.

Soakum: How much did we make?

Skinnem: Well, we have money. It makes no difference.

[Phone rings.]

Soakum [answering]: Yes, Mrs. Offlmug. Are you sure this is Mrs. Offlmug? Just a minute, now. You are absolutely sure you are Mrs. Offlmug? You say the walls are crumbling? The electric wiring won't work? The wire has just been wound around the studding and then brought through? All right. Shingles are falling off? Are you positive this is Mrs. Offlmug? You are? All right. This is Skinnem and Soakum. You GO TO HELL. [Both go out.]

[CURTAIN]

Drawing the Crowds to the Side Street Location

(More than all others, the electrical dealer can reap the benefits of effective advertising because he has, at his very hand, the most effective advertising medium. The story below proves that phenomenal profit-increases result from the electrical advirtisement of electrical stores.—The Editor.)

In Sacramento on Ninth Street, between the capital city's two busiest streets (K and J), is one of Sacramento's attractive electric stores. Yet no one walking on K or J Street last August would have known that this store existed. Its attractiveness failed to catch the eye of the thousands of

The electric sign which has been responsible for drawing trade from two bordering main streets to a side street store

potential buyers of electric conveniences that passed on these busy streets day and night.

The manager of the Sterling Electrical Company, Inc., wanted a larger share of the patronage of those crowds. There were two things he could do. He could move to K or J Streets, or he could draw the public to his store. But if he moved to J he wouldn't catch the crowds on K. Furthermore, moving to either street meant a triple increase in rent.

A very attractive electric sign was erected. The accompanying chart shows the result. The sign went up in August. Then followed an immediate increase in counter sales. The increase continued

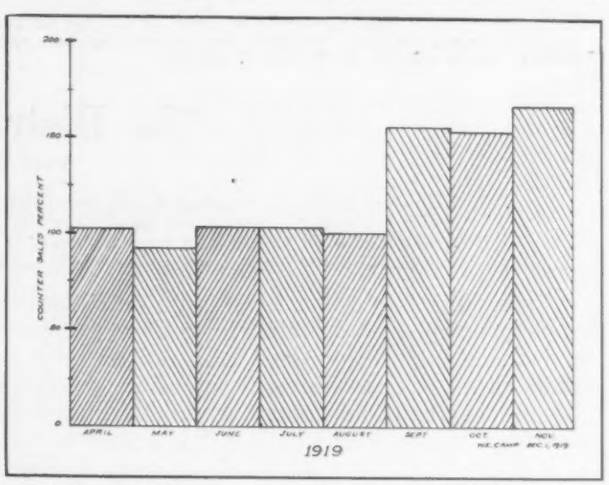


Chart showing the increase in counter sales which resulted from the installation of an attractive electric sign in front of a western shop in August, 1919.

during the second month. By the third month counter sales almost doubled.

It is estimated that the cost of the sign was equal to ony one month's rent on the busy street. The cost of operation amounts to about $15 a month, including lamp renewals, depreciation, electric current, and interest.

The Sterling sign works day and night for "Sterling Electrical Company." No one traveling on K or J Streets today can help noticing the sign when passing Ninth. It shows the progressiveness of the modern electrical merchant. Other electrical dealers can profitably follow this example and advertise electrical stores electrically.

The lady sends word by her maid that she regrets she is not at home—you would regret it exceedingly if you were not at convention ——

—————— PASADENA — MAY 17-21, 1920

The district manager must know his men and must see that his men know each other, if his district organization is to function as a perfect unit of the entire company. The above group of employes have gathered for an organization meeting which is the method one alert district manager uses to organize the thought of his men.

The District Manager

BY S. M. KENNEDY

(Unusual ability is required in the man who manages a territorial district for any large public utility company, since in his hands lies the company's local reputation for integrity and progressiveness as well as its regular business. The qualities necessary in the make-up of the successful district manager are set forth and ably discussed in this article.—The Editor.)

It is quite impossible for a large public utility company, supplying an electric, gas or telephone service, and covering a great area of territory, to handle all its business through one office. "Remote Control" may be of advantage in the distribution of some high voltage currents, but it is a poor way to serve customers who may reside at some distance from the central or general offices. Consequently, for the better protection of business and as a means of supplying a higher grade of service, the territory occupied is usually divided into districts, each one of which being in charge of a district manager. This is an important position, for not only is the operation of the company's business in his hands, but also its standing in the community and its local reputation for integrity and progressiveness. The district manager acts for the company in its intercourse with the public by virtue of his appointment, and he acts for the public in its intercourse with the company by virtue of his position. He must fairly represent both sides, as they are really a unit, the dual relations being so intermingled that a parting of the ways does not exist. That is, the permanent interests of the utility company and of the consumer are really along parallel lines.

The Organizer

While working under the direction of the general offices, the district manager must have an intimate knowledge of the work in all the departments of his organization, and of the duties and capabilities of each of his men. He must be not only a foreman and cashier, and with it all, a master of diplomacy. The processes of modern business are sometimes likened to a complicated machine, and the executive must program every part of his organization as carefully and thoroughly as the inventor designs the details of a great engine. The management of a public utility company is organized thought, exactly as the machine is the organized thought of the inventor.

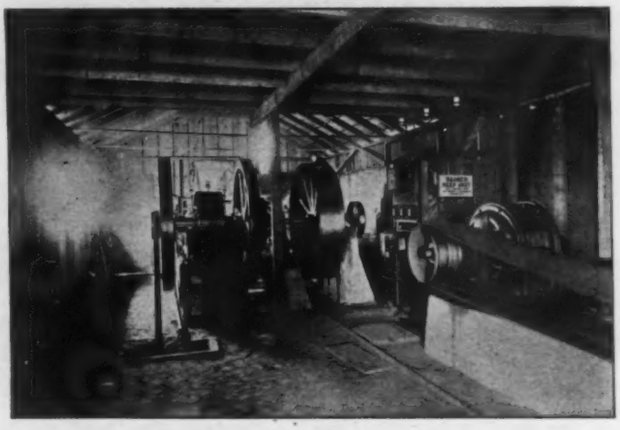
The district manager should be a specialist along lines which make for efficiency in administration. There is just as much opportunity for real invention in the field of organization and administration as in the field of mechanics. The mechanical inventor studies out a machine in which all the parts are to work together to produce a given result. In doing this he deals with inanimate material; his work is wrought out along mechanical lines; he knows in advance how each gear, spring, pulley and lever will fulfill its mission. Its power to do is a mechanical certainty. The mechanical inventor does not give to any part of his machine any latitude whatever, and all the initiative must come from him.

The true executive, be he general manager or district manager, must also be an inventor; he, too, studies out a working machine where all the parts are to move in harmony to produce a given result.

However, he deals not with inanimate material, but with men with wonderful possibilities of initiative to help or hinder the working of the organization. To men working as parts of one harmonious whole, must be given a certain amount of latitude, in which to exercise whatever power of initiative they may possess. They must be given intelligent direction and then left, in a measure, to work out their problem in their own way. Of course, they are always under observation, and their work follows certain established lines—but no code of rules or regulations ever drafted can take the place of intelligence. The district manager should have a knowledge of men, exactly as the mechanical engineer has a knowledge of materials and mechanics. The right men must be trained and fitted into their proper places in the machine in order to obtain the right results.

The Real Head

The public utility company which is operating in a large territory, with an eye to present requirements and future success, must build up the standard of the district manager. Men of high grade should be selected for the position, and the position should be made as important as possible, compatible with a company's general organization and methods



The district manager is responsible for local business-building and must continually work for the development of loads other than the lighting load in order that the power company may operate at full efficiency. The accompanying illustration shows a 76-hp. motor displacing a 100-hp. engine operating a pumping plant.

of operation. The district manager should not be a puppet or a marionette to act and move when some one in the general offices pulls a string. He should be the real head of his company in the territory under his control, and should be a conspicuous figure in that company. His company should be localized and the general offices of the corporation should only be referred to incidentally, in all intercourse with the public, and not as a center from which all instructions must come and all authority emanate. The district manager should be made responsible for the development of his local organization—and with this responsibility he should be expected to obtain satisfactory results.

The district manager may not have had an engineer's training, but at any rate he should gradually become an engineer by absorption, and should be absolutely familiar with the commodity handled by the company, and the various methods of distribution which it has adopted. He must know all details in order to talk intelligently, either in public or in private, and understandingly to direct the work of the men under him. His position is no sinecure—but a real active job, requiring the use of all faculties and the benefit of all his experience.

Custodian and Guardian

Perhaps one of the most important positions the district manager has to fill is that of custodian and guardian—custodian of the company's property and guardian of its interests. The property of the company in his district is under the general supervision and care of the manager, and as far as possible, he should know all that is going on, or being done in the way of changes, additions or betterments to the system. The care of the property also means its proper maintenance, and maintenance includes its appearance to the eyes of those inside and outside the organization. Cleanliness, neatness and tidiness are just as essential as quality and stability, as far as the public is concerned, and these attributes should never be overlooked. He should also know the weak places, if there are any, and be on the alert and able to act promptly should any trouble occur either from accident or destruction caused by the elements.

Not only are the plants and buildings under his care, but he must be familiar with the franchises, licenses and permits under which the company operates, to see that nothing may be considered by local legislative bodies which might threaten or imperil their value. With this end in view, it is of the utmost importance that all matters affecting or liable to affect the company's interests directly or indirectly should be immediately brought to the attention of the proper department in the general offices. The manager should not take it for granted that anything of local importance will be known without his saying something, but he should promptly send in his report to the proper officer. If the information has already reached the officer from another source, it won't hurt to have it again. Far better that the report go in from two sources than none at all. On the other hand, after making his report, the district manager has relieved himself of a certain amount of responsibility and can then await instructions how to proceed further.

Administrator of Funds

The district manager is at all times expected to defend and advance the interests of his company. When it comes to the question of spending the company's money for any purpose, he will find it a good rule before making a recommendation to ask himself, "If this money were mine, if this business were mine, would I make this investment?" If he makes an unqualified recommendation for an extension, be it big or little, it should only be after giving an affirmative answer to this question. There may at

Wm. Jennings Bryan is always running—you would run, too, if that were the only way to get to convention ——
—————— PASADENA — MAY 17-21, 1920

times be reasons why it might be necessary for him to pass an application for an extension up to a higher officer without a recommendation, and the extension may be authorized for special reasons, perhaps affecting the company's interests elsewhere. However, it is up to the district manager to thoroughly understand local conditions, and the company must rely largely on his knowledge and recommendations, before authorizing any increases of investment in his district.

Business Builder

Perhaps in no other line of industry have there been as many changes in connection with business development as in the central station industry. Only a few years ago, the business was entirely confined to that of supplying light. For five or six hours daily the plant was busy, and for eighteen hours it practically stood idle. Interest and depreciation, however, were going on all the time, and the cost per kilowatt-hour generated and distributed was necessarily high. Gradually a power load was developed, and the plant was busy for another twelve hours, and fixed charges per unit were enormously reduced. Then certain kinds of business were induced to operate all through the night, and the central station plant eventually began to pull some kind of a load for twenty-four hours each day. But the alert district manager knows that there is no limit to the development of the electrical business. He will regularly gather around him his salesmen and assistants, and show them what can be done to increase the company's income from present investment, and to point the way to profitable extensions which will produce greater earnings for the company in the future.

Some men say the lighting business has already been developed. The alert manager can show his men that there is not a home, office building, business house, industrial plant or factory in his territory that would not be better off if more lights were added in this place or that. More and better street lighting is demanded, as a precaution against accidents and a protection to life and property. This field is capable of great development. Electric power is now used in every direction—but not to the extent it should be. The alert manager can show just where more can be added to present installations, and where it can be introduced to displace other prime movers whose operation may be improved upon. And when it comes to the newer uses for heating and cooking, the alert manager can say to his men, "Gentlemen, you may start all over again on every street in every town, for every present consumer and every new customer must eventually own and operate an electric range." Scores of proven appliances for new uses are appearing for sale every year, and when these appliances may be counted by the hundreds of thousands on a company's system, there soon comes a demand for reinforcement of distribution lines in residence districts and a more constant load on stations and substations every day in the year. The alert manager knows he is now at a stage when load building has become more scientific; where load factor improvement is substantial, and where present investment has no idle hours—and that eventually the only limit to scientific development may be a load curve which will resemble a straight line.

Collector of Revenues

Not the least of a district manager's duties is that of collecting the revenues derived from the service supplied. It is well worth remembering at times, that all the work of harnessing the mighty mountain streams, all the work of building great power houses, all the money invested in long transmission tower lines and local distribution systems, all the feats of engineers, all the grinding machinery, all the executive ability of the officers and all the routine of the clerks—every detail handled from the president down to the elevator boy, lead up to the meter—and the product of the meter is dollars and cents.

The business of a central station company cannot be run successfully without giving liberal credit to thousands of people. Corporations such as street railways, transportation companies, telephone companies and department stores, receive their money before the goods are delivered, but the electric company is required to deliver its service before it becomes due and payable. Consequently, it is of paramount importance that after waiting a month or more for its money, the electric company should collect its revenues as soon as possible after they become due. There are thirty-seven reasons why electric bills should be collected promptly. The first is, the company always needs the money. The second is that it is easier to collect soon than late. The alert district manager has no care about the other thirty-five reasons—the first two being sufficiently convincing. The amount of latitude and discretion given a district manager in handling certain individual accounts should be liberal. This refers to consumers whose business is seasonal, and whose money receipts may be irregular for one reason or another. But the general results are reflected in percentages of collections to moneys due, and the alert manager

A free electric cooking school like the one shown above is effective in establishing friendly relations with the public and convincing customers that the company policy is one of good-will.

will see that the percentage of his delinquents is held down to a minimum. There is always the last resort for an electric company to adopt when forcing payments, that is, discontinuance of service. This is usually effective, but should not be used until all other means of persuasion have failed. No man or woman ever feels the same toward a company if the service is once disconnected for non-payment, and it is sometimes better to nurse a delinquent along for a while, if there is a reasonable hope of settlement, rather than abruptly to sever the connections and leave a consumer sore and resentful for years afterwards.

Harmonizer

The district manager requires to be a man of many parts, and there is no part more important than that which might well be termed "the harmonizer." The best definition of harmony is to say that it is the antithesis of discord—and if discord exists within the ranks of an organization, or with consumers on the outside, there is friction—and friction means loss of power. The harmonizer in a district is able to make the company's affairs run smoothly, and as harmonizer, the district manager will find it advisable at times to use a considerable amount of oil in order to reduce friction to a minimum. While the district manager must never lose sight of the duty he owes to the company, he must frequently put himself in the other fellow's place, so that he may properly understand some conditions and adjust them satisfactorily. The employes working under him will sometimes become fractious because of real or fancied grievances. If harmony does not exist in this direction, some part of the company's business will surely suffer. In handling employes, the district manager needs to use great tact to smooth out the wrinkles, to encourage where encouragement is needed, to reprove where reproof is necessary, and to commend where commendation is deserved.

Friendly Relations

The company must look to the district manager to maintain friendly relations with its customers. He is the main point of contact, and by precept and example, it is up to him to indicate how the public should be cared for. The clerks, collectors, salesmen, meter readers and trouble men are liable to do in this respect what they see their superior do, and what they know he wishes to be done. And the public will keep on judging the company by the words and acts of the employes it sees rather than by the published policies of officers and directors who are seldom seen and rarely known. The district manager cannot be too careful and particular in the selection of employes coming in direct contact with consumers and the public. An ill-natured, indifferent clerk can make more trouble for the company in one day than two tactful men could patch up in a month. The very existence of the company depends upon the good-will of its customers. The business cannot be developed if present consumers are not satisfied, and they are easily and willingly pleased and satisfied if they receive that courteous and prompt attention to which they are at all times entitled. The alert manager will find that a bright, cheerful office, devoid of partitions, gratings and windows between the employes and the public, will have a beneficial effect and help both clerks and customers to understand each other better. The manager cannot give too much attention to what goes on in the front of his office—an observing traveler tells of the following incident:

"I stood in a large railway station, awaiting my turn at the ticket window. Before me in line was a man neatly clad, clean and unmistakably a foreigner. He quietly passed a five-dollar bill beneath the rod and waited. The ticket agent caught up the bill with a vigor that threatened to tear it in two. 'What do you want?' he grumbled. 'I want to go to Boston,' said the man with imperfect English, but with perfect courtesy. 'To Boston!' bellowed the agent, 'I guess you don't know what you want.' 'I want to go to Boston,' repeated the man. 'You're either drunk or crazy,' snapped the other. 'This won't buy a ticket to Boston,' and he thrust the offending bill back through the window with a grunt that dragged itself into a crude smile as he turned to me. The stranger-in-our-land took up his money and walked away, his face pathetic in its pained bewilderment.

"As I folded my ticket, I caught the comment of a keen-eyed business man who stood near. 'Well, I always thought I knew why they have gratings on ticket office windows, but that incident gives me a new idea—it's to keep some agents from hitting the patrons of the road. I tell you, if I were a railroad president, I'd disguise myself like our friend bound for Boston, and two or three times a year I'd call upon every one of my employes. Whenever I'd receive a shade less consideration in my disguise than I received as 'the boss'—the man guilty of discriminating would be discharged.' "

The district manager may well look into the question as to how many of his employes are rendering the same kind of service to consumers as they would to him as the boss. How many would stand the business man's test? Of a different type is a story that comes from another source, concerning a recent incident in the office of a power company. A customer, who was also of foreign birth, called one day on the manager to ask for some information regarding his account and contract for service, to be used in connection with a lawsuit the customer had with a third party. The information asked was duly sent and later the customer called upon the manager. He said, "Mr. Blank, I want to thank you for the data supplied, and your courtesy extended to me in connection with the matter." The manager stated that he was glad to furnish the information asked, and told the customer that as for the courtesy, he was entitled to receive that at any and all times. The customer smiled and said, "Mr. Blank,

Something happened when the Germans met the Yanks—there will be something happening at the big meeting in Pasadena which you cannot afford to miss ——

—————— PASADENA — MAY 17-21, 1920

before I die I am going to visit Ireland, so that I may learn to say some things as nicely as you do."

The Arbitrator

Experience has demonstrated that in the public utility business, the time comes around when trouble of some sort is threatened in each district. It may be a municipal ownership agitation; the application for a franchise by an opposition company, or a demand for a concession in rates, or something else. Then it is that the company needs a friend and then it is that the public remembers all the good and all the bad that the company is responsible for in the past. The district manager may have people pulling for him or working against him, depending upon the way these same people have been previously treated in their intercourse with the company through its employes. One thing is sure and that is, if all the people were pleased with the company, then they would all be on the company's side in any controversy. Knowing this to be a fact, the wise district manager will see that all his points of contact are so protected that no matter how a customer may feel when he enters an office, he will go away pleased. Such a condition may be of greater value than all the franchises, permits and licenses that could be granted or awarded. At any rate, such franchises, permits and licenses must automatically become more valuable, when the permanent good-will of the public has become a part of the company's assets.

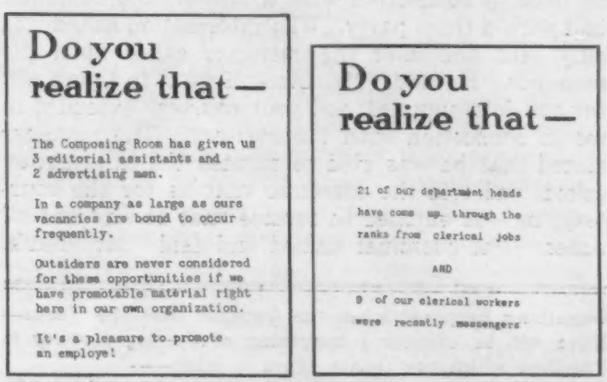
Western Ideas

IF YOUR COMPETITOR talks about you, put him on your payroll. Never mind what he says so long as he talks.

The above sentiment has been expressed by a Colorado dealer who is evidently a believer in the unusual 'ad' and who is keen enough to realize that even derogatory criticism by a competitor makes for excellent publicity.

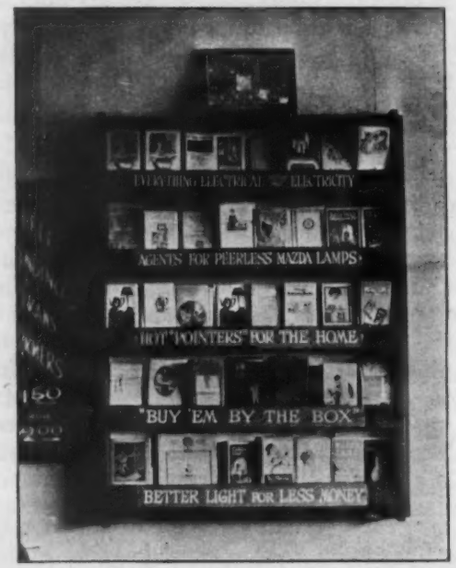
INTERNAL BETTERMENT is the watchword of wide-awake companies today. Company pride, loyalty, and vision are being stimulated among employes in various ways.

The bulletin boards in the offices of the McGraw-Hill Publishing Company display posters which aim to awaken employes to the opportunities of advancement which their own firm is anxious to offer.


Do you realize that—
The Composing Room has given us 3 editorial assistants and 2 advertising men.
In a company as large as ours vacancies are bound to occur frequently.
Outsiders are never considered for these opportunities if we have promotable material right here in our own organization.
It's a pleasure to promote an employe!
Do you realize that—
21 of our department heads have come up through the ranks from clerical jobs
AND
9 of our clerical workers were recently messengers

Effective bulletin board notices help to create enthusiasm among employes

ADVERTISING MATERIAL is effectively displayed by the Golden State Electric Company in Los Angeles. A rack which matches the woodwork of the store is divided into sections, each one labeled with a sign clever enough to attract every customer's attention. In this way the dealer can take advantage of the customer's slightest interest in any electrical appliance. There is no better salesman than a good pamphlet in the hands of an interested customer.



Booklets find their way to the interested customer by way of this well designed rack

The signs are changed every week or two so that the rack has always something new to tell the customer.

PROFESSIONAL LEADERS are as necessary as professional demonstrators in attracting customers to a store. It is a well known fact that one sheep will invariably follow another. Why not make use of this knowledge in our work-a-day selling world?

At a recent window demonstration there was a large, interested gathering watching the wonderful cures of some patent medicines, but when the aspiring performer held up a placard inviting the onlookers to come inside the shop for a heart-to-heart talk, without exception the crowd dispersed and left the unsuccessful window artist to pick up the work again from the beginning of the story. After watching the scene for three unsuccessful performances, a certain man took the lead and accepted the invitation to have the closer interview, "without obligation." He was immediately followed by three others, all eager to listen and learn. When he left the shop, those who had seen him from the street during the conversation went to him unhesitatingly for information.

A tastily arranged window, an unpainted, intelligent demonstrator, familiar with the apparatus and actually "making it work," will, with two or three "customers" to start the crowd in the right direction, add noticeably to the sales.

Electricity at the Orange Show

BY W. B. STODDARD

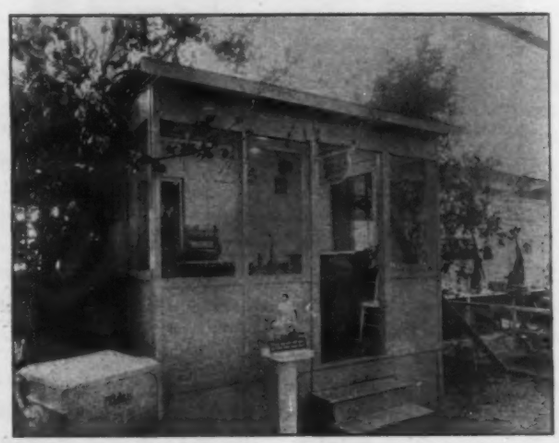
(Abundant proof that electrical goods are susceptible of highly artistic treatment for display purposes is afforded in the following description of electrical exhibits at the Southern California Orange Show. The colorful settings and ingenious devices employed should prove of interest to all who are concerned with electrical merchandising and the various types of publicity to which it lends itself.—The Editor.)

Electricity was one of the most important factors in giving beauty and brilliance to the tenth annual Orange Show recently held near San Bernardino, California. In honor of the event the city of San Bernardino was in gala attire. The big city hall was completely outlined in lights, and chains of lights of different colors were thrown across all the principal streets, while at the Show the electrical utilities and electrical merchandise concerns vied with each other in the attractiveness of their displays.

The elaborate exhibit of the Pacific Electric Railway was of deep cream, brilliantly trimmed with oranges, lemons and grape fruit, and having long panels at the four corners showing typical California scenes, such as the Missions, ostriches, beaches and orange groves. Within was a life-sized figure in white and orange holding a sheaf of narrow orange ribbons, each of which ended in a miniature electric car about two inches long. The floor disclosed the topography of southern California, and showed the entire network of city and interurban lines of the company. Around the edge was a track on which ran two electric cars—freight and passenger—about 18 inches long. A card at the base of the display advised: "1200 miles of railway."

The Fresno water department had an artesian well, which flowed over rose-colored lights into a concrete basin, the broad rim being fringed with scarlet cyclamen.

The San Gabriel Valley Chamber of Commerce, who won the first prize in the feature exhibits, had their revolving pyramid of oranges and other citrus fruits, which was topped with a figure of the Angel Gabriel, lighted with a series of rose-hued bulbs, concealed among the foliage.



This neat back porch, equipped as a complete electric laundry, was planned by the Woodill & Hulse Electric Company of Los Angeles, and found great favor among the housewives.

Featuring Household Appliances —

In another tent devoted to industrial displays, was an attractive idea inaugurated by the Woodill & Hulse Electric Company, Los Angeles, whose display was calculated to implant in the heart of every woman the desire to possess an electric washing machine. It showed the screened-in back porch of a California bungalow, raised several feet from the ground, painted a soft grey and half covered with a big rose vine. In the earth outside were planted shrubs and flowers. The door stood invitingly open, and inside was an electric washing machine in operation. A young couple were on hand to demonstrate the good points of the machine, hand out literature, and take orders if desired.

One of the central exhibits, occupying double space, was that of the Blue Bird Washing Machine Co. It had pillars of green, and a green latticework overhead, hung with masses of pink roses and green foliage. Suspended from the roof were a number of old-fashioned lanterns, with paper slides, upon which bluebirds were painted. Several of the washing machines were shown in operation, and a pleasant attendant explained their manipulation.

The Illinois Electric Company, western branch, featured vacuum cleaners. Fastened to the wall were gay balloons of many colors, and several of them, fastened together, with little dolls suspended from them, floated about the booth. On the wall, too, were the original sketches from which were made the pictures that adorned their booklet, "The Woman's Part in Modern Art." They also handed out to all visitors little credit coupons, good for $2.00 towards the purchase of a vacuum cleaner, which would be honored by any authorized Apex dealer in southern California.

It is a mistake to invite a lady to dinner when you have only 25c. in your pocket—it would be a grave error for you to miss the big spring conventions——

——————— PASADENA — MAY 17-21, 1920

The part played by color in all these exhibits was particularly noticeable. The Southern Sierras Power Company's display had a low fence and gate in the background, painted a vivid orange, separating the window from the interior of the store. This gate was twined with smilax, and the gate posts were topped with baskets lined with smilax and filled with oranges and grapefruit. A tall pedestal in the center of the display held a big shallow basket of oranges, lemons and grapefruit, the basket being

The Southern Sierras Power Company's exhibit was notable for its distinctive use of color and the sunny effect of its decorations and illumination. The orange painted fence upon which smilax was twined, and the shallow baskets of oranges tied with green and yellow ribbons were effective in carrying out the brilliant color scheme.

tied with green and yellow ribbons. The floor was of orange crepe paper with a border of green, upon which were laid a number of fine specimens of citrus fruit. Over the low gateway the interior of the brightly lighted salesroom could be seen. Here was shown an electric range, and an electric washing machine, while a large card by the range suggested: "You can cook without electricity—but not so well."

The Field Electric Company had an orange tree, set in a tub covered with green paper. From the trunk of the tree extended broad ribbons of green or orange, which reached to some electric appliance —range, percolator, chafing dish, toaster or iron. In each corner of the window were set baskets of grapefruit and oranges. In the day time this orange tree appears to be covered with natural oranges, but at night it was seen that each was a little orange bulb with a light inside.

The Prest Electric Company chose the Orange Show colors, the dome of their booth being hung with long streamers of yellow and green. In this green and gold setting, decorated with oranges and foliage, they had a good display of the Ohio Tuec cleaners and Crystal washing machines.

Fairbanks, Morse Company had a splendid exhibit of machinery, some of it electrically operated. Their power fruit sprayer attracted special attention. In the background was a panorama showing a grove of orange trees, while in the foreground, planted in the moist earth, were half a dozen fruit bearing trees. From time to time a demonstration was given of power spraying, the mist which enveloped the trees being guaranteed to deal death and destruction to all forms of citrus tree pests.

THE VALUE OF NEATNESS

BY C. M. TWOMBLY

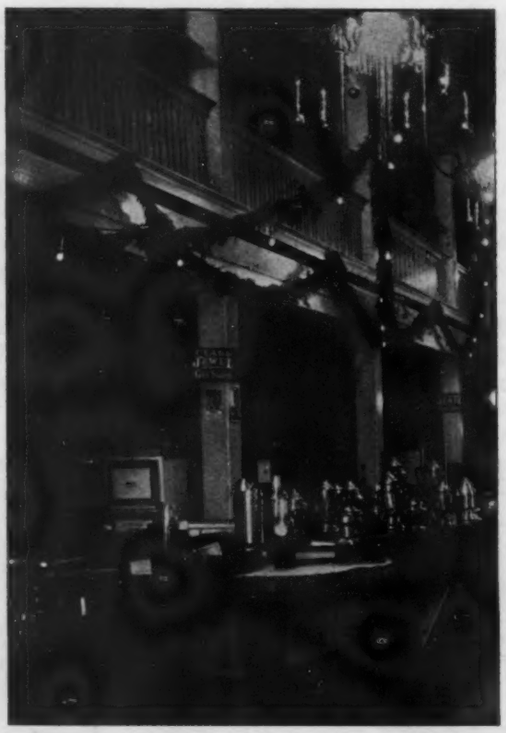
(A certain contractor-dealer has been able to prove that artistic display and consistent neatness always bring in generous returns. His ideas on the necessity of neatness in the shop are given below.—The Editor.)

Fine woodwork does not bring patronage. Neatness is one of the prime factors which will attract customers into a store and hold them as regular patrons. Keep the articles you have for display immaculately clean. Display them in the best way that you can and you will find that your business will increase and your list of regular customers will grow steadily longer.

The Los Angeles Beacon Light Company was able to increase the amount of its sales 100% during the month of December solely through neat and artistic display of Christmas goods.

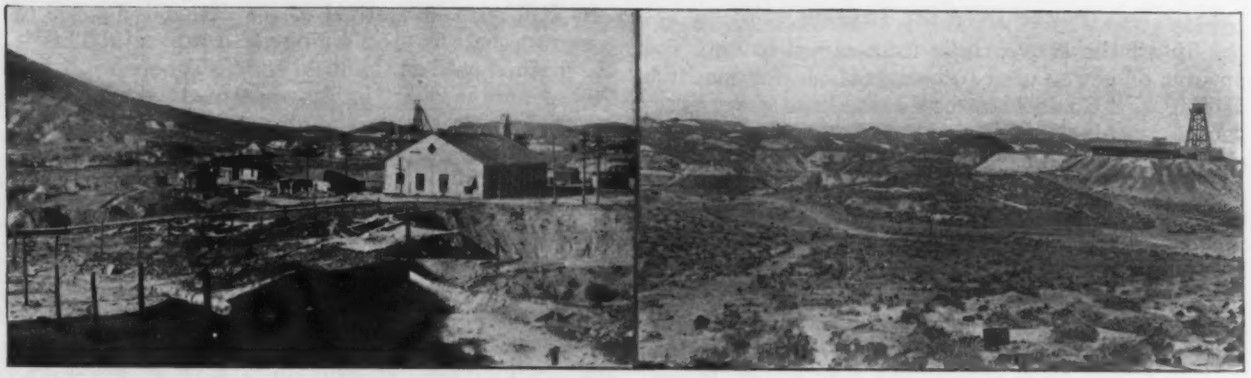
All contractor-dealers realize that window advertising is more effective than advertising of any other sort and they should realize that here, above all other places, the doctrine of neatness is of supreme importance. A slovenly window cannot be effective.

The Beacon Light Company have two very large windows with plenty of light to display the articles so that they attract the eye. Do not crowd the



This Los Angeles shop increased its sales 100% in a single month solely by displaying its Christmas goods in the neat and artistic manner shown above.

articles, but place just enough to look right and to give the pleasing effect which always comes from correct balance. Neatness is one of the greatest things in life; it will help to get you there every time.



Typical views in the Goldfield mining district, showing the Goldfield Consolidated Mines on the left with the Laguna headframe in the background and the headframe of the Florence mine in the picture to the right.

Electricity in Gold and Silver Mining

BY B. B. BECKETT

(In the West electricity plays an important part in the mining of precious metals. The following article tells of the actual power consumption of a typical property in Nevada and analyzing the most important electrical operations involved. The author has for some time been electrical engineer for these mines and is now doing consulting engineering.—The Editor.)

In the West, the mining of precious metals was one of the earliest and has always been one of the important consumers of electric power. In mining proper, the electric drive still shares honors with compressed air, but in milling, the electric drive is almost universal.

The title of this paper is intended to cover both mining proper and also milling, since gold and silver ores are usually milled at the mines as part of the same enterprise. Of the two operations, mining and milling, the latter is the heavy power consumer, taking about three-fourths of the total. This, of course, refers to producing mines, excluding those in the development stage only. Milling, also, is the more desirable load from the central station point of view, since it is steady and continuous, 24 hours a day and every day in the month. The load-factor of a mill load is about 80% and that of a combined mine and mill load about 70%. Power consumption for all purposes will be close to 40 kw-hr. per ton of dry ore mined and milled, of which 30 kw-hr. will be consumed by milling alone.

Consumption for Nevada Mines

The following table shows the actual power consumption of a typical property in Nevada, that of the Goldfield Consolidated Mines Company at Goldfield. These figures represent practice at Goldfield for the years 1915-16-17, and correspond to a production of 1000 tons of dry ore per day. Mining was carried on through vertical shafts with an average depth of 600 ft., with a moderate amount of water to be pumped, and the mill was the usual stamp mill with cyanide treatment.

The volume of production does not affect the power consumption per ton provided the plant and equipment are of proportionate size. For instance, at the Nevada-Packard mine, at Packard, Nevada, where the production is only 100 tons per day, the power consumption for all purposes has averaged only 30.9 kw-hr. per ton for three years, measured on the low tension side of transformers. This figure covers both milling and mining, but the only power used in mining in this case is that for compressed air, about 4.5 kw-hr. per ton, since the mine is worked through a tunnel under the ore bodies and above the mill. At Aurora, Nevada, the power consumption for all purposes in the summer of 1916 was 43.4 kw-hr. per ton, of which the mill alone was responsible for 36.07 kw-hr. Production at Aurora was 500 tons per day. Mining was done through a tunnel as at Packard, and hence the only power for mining was for compressed air, 5.1 kw-hr. per ton, and for the electric trolley railway in the tunnel, 0.93 kw-hr. per ton. The greater power consumption at Aurora in milling is accounted for by the fact that the ore was entirely of hard quartz and came from the mine wet and sticky so that it would clog up in the crusher and conveyors.

POWER CONSUMPTION AT GOLDFIELD

	Motor capacity hp.	Maximum load hp.	All day average hp.	Kw-hr. per ton dry ore
Mines:				
Light equivalent		15	10	.2
Compressed air	400	420	260	5.3
Pumps	280	210	93	2.0
Hoists	750	1000	88	1.8
Miscellaneous power	100	30	7	.2
Total Mines,	1530	.....	458	9.5
Mill:				
Crusher (gyratory)	150	50	10	.26
Conveyors to battery	60	40	12	.29
Stamp battery	250	240	212	4.26
Tube mills	400	480	448	9.20
Chilean mills	200	300	190	3.86
Concentrate tables	60	34	31	.63
Air compressors (for agitation chiefly)	250	250	240	4.9
Pumps	340	215	156	3.3
Miscellaneous power	270	100	50	1.2
Light and heat	.....	80	40	.8
Total Mill,	1980	.....	1389	28.70
General Depts., light, heat, and power,				1.4
Losses in line and transformers and in regulation,				3.4
Total all				43.0

The first baby is always beautiful—but no more wonderful than is Pasadena in Maytime ——
—————— PASADENA — MAY 17-21, 1920

Power Used for Drilling

In all the above, it is interesting to note the amount of power used to compress air for machine drilling. At Goldfield, a record was kept of the number of machine-shifts, that is, the number of machine drills in use each shift. After making proper allowance for air for other purposes, the power consumption per machine-shift was computed and found to vary from 65 to 100, averaging about 80 kw-hr. Each machine is in actual operation only about 4 hours out of each shift, and therefore consumed the surprising amount of 20 kw. continuously while in operation. This is the power to compress the air to supply the drill, and includes all losses.

In the above figures for power used in mining, it should be stated that these cover development work and the removal of waste as well as ore, so that the figures per ton of ore would be much less if the work were confined to ore alone. For instance, in the table above for Goldfield, the item of hoisting is 1.8 kw-hr. per ton of ore, but the total work of hoisting for all purposes, including waste and men and timbers as well as ore, was about double that for ore alone, so that this figure may be divided in two, making 0.9 kw-hr. per ton. Now the energy represented by lifting one ton 600 ft. is 1,200,000 ft-lbs., or 0.45 kw-hr. Therefore the over-all efficiency in this case was about 50%.

Load Factor for Hoisting

It will be noted that the load-factor for hoisting is very poor, less than 9% at Goldfield, according to the above table. This is on the basis of the maximum momentary demand, unregulated. As a matter of fact, the hoisting peaks were absorbed by a storage battery through a motor-generator regulating set and did not fall upon the transmission system. On account of the extremely fluctuating nature of a hoist load, intensified by the poor starting characteristics of the induction motor, it is customary for power companies to impose restrictions upon this service, either by special charges or by requiring special regulating apparatus. This is one reason why compressed air has been used in some instances even where the air was compressed with transmission power, as in the large installation in Butte. More recently the fly-wheel motor-generator set has been used for this purpose, the fly-wheel acting as a reservoir of energy from which the hoist impulses are drawn. Unfortunately this method is efficient only when the hoisting is done on a regular schedule and continuously, as long as the set is in operation, else the no-load losses of the set are excessive in comparison with the net energy used.

Another method that has been used is the very ingenious one of automatically unloading a main air compressor simultaneously with any sudden increase of load. This, of course, involves the use of a compressor large enough to supply the required amount of air after allowing for the time it runs unloaded, and also involves the inefficiency due to this idle running. The method, therefore, is best suited to infrequent and irregular hoisting, being in this just opposite to the fly-wheel method.

Still another method of regulation is by use of a storage battery and motor-generator set. This is the method used at Goldfield and at Tonopah. It has the advantage over the fly-wheel method of providing in a single set for the absorption of fluctuations from any number of hoists or from any other apparatus, and of having very small no-load losses. Such a plant also performs other service, particularly that of furnishing emergency power in case of failure of the main supply. The plant at Goldfield served five hoists, aggregating 750 hp., later increased to 950 hp. by the addition of a sixth hoist. It could, under ideal conditions, absorb a power swing of 1000 kw. and could furnish, as emergency reserve, about 250 kw-hr. The no-load loss amounted to 35 kw., and the storage battery working loss of the entire plant

This substation building houses the regulating plant and the distributing substation of the Goldfield Consolidated Mines Company

about 50 kw. The loss in the storage battery amounted to about 8000 kw-hr. per month, the kilowatt efficiency being only about 60%.

Water entering the Goldfield Consolidated Mines at the principal sump amounted to 200 gal. per min. and was lifted a total of 1850 ft. in two stages, the first, 400 ft., by turbine pump, and the second by triplex pumps. The turbine delivered approximately 500 gal. per min. and consumed 75 kw., including line and transformer losses. The triplex pumps delivered 446 gal. per min. and consumed 160 kw. The corresponding efficiencies are 50.2% and 76.0%, respectively. The turbine was handicapped about 5% by a long discharge pipe.

Crushing and Stamping

Referring again to the table for power consumption at Goldfield, it is interesting to note that the amount for crushing is so small, only a little more than one-twentieth of that for stamping. In the first of these operations, the ore is reduced from the size produced in mining down to pieces the size of eggs; and in the stamps, it is reduced from this to the size of peas. In the tube mills and Chilean mills together it is reduced to powder. This last operation has the heaviest power consumption of all, taking three times as much as that of stamping. It is to be noted that about two-thirds of all the power used in milling is accounted for by the process of pulverizing the ore, and at Aurora and Packard this proportion was three-fourths or more.

In predetermining the power consumption in any given operation, the foregoing figures will be useful, and also, certain computations may be made as follows: Power for stamps can be predetermined quite closely, being simply a function of the weight of stamps, the height to which they are raised and the speed. All of these factors are independent of the rate at which the ore is fed except that the height will be a little less with a full mortar than with an

The mill of the Nevada-Packard mine at Packard, Nevada, is shown above. This is a 100-ton cyanide mill of the latest design, treating both gold and silver ore.

empty one; hence the maximum efficiency is obtained when the ore is being crushed as rapidly as possible. A stamp battery load is very constant, changing only when stamps are hung up. At Goldfield, the stamps weighed 1050 lb., dropped an average of 6.75 inches, and each dropped an average of 104 times a minute. There were 20 stamps per motor; therefore

$$\text{Hp.} = 20 \times \frac{104 \times 1050 \times 6.75}{12 \times 33000} = 37.2$$

The average output of these motors was 47 hp.; therefore the mechanical efficiency of the drive was 79.2%. This covers loss in cam shaft and cams, two belts and counter shaft.

Tube Mill Loads

A tube mill load is also very constant, but it can be predetermined only very roughly by calculation. It is a function of the speed, weight of charge, and the height to which the center of gravity of the charge is raised by the rotation. Evidently this last factor depends upon the speed which therefore affects the result in other than simple ratio; but for maximum grinding, the speed should be such that the pebbles are kept constantly rolling down hill but not carried over by centrifugal force. This will also be the condition of maximum power. The mills at Goldfield were 5 x 22 ft., revolved 23 times per minute, and the weight of charge was about 14 tons, filling the mill about half full. Assuming that the rotation caused the surface to be deflected to an angle of 60° to the horizontal, the torque necessary to maintain equilibrium was 25,000 ft-lbs. On this basis, the useful work was 54.8 hp. per mill, or 164.4 for each group of three. The average output of the motor driving each group was 224 hp. This indicates a mechanical efficiency for the drive of 73.4%, covering losses in first belt, counter-shaft, back belts, jack shafts, gears, and tube mill journals. Even at constant speed, the height to which the charge is elevated will vary considerably with the character and condition of pebbles and of ore. In general, the power consumption increases when the rate of feed is increased, when the feed is relatively coarse and sharp, and when the pebble charge is increased. In Goldfield, variations of as much as 15% were observed with change of feed.

A crusher load fluctuates badly and the driving motor must be several times the size required for the average load. Where belt drive is used as is usual, the starting requirement is severe, for the belts must be either very heavy or very tight, else the fine dry dust will cause them to slip. For this reason, gearing is to be preferred, but if belts are used, then slipping motors should be used.

Pumping

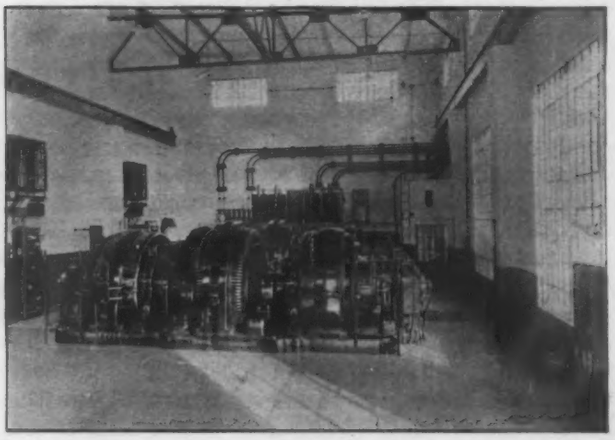
The pumping of pulp and solutions is responsible for a large part of the power consumed in a cyanide plant. For clear solutions, triplex pumps are generally used; but for slimes and gritty solutions, centrifugal pumps are necessary and these are lined with wear resisting material. The mechanical efficiency of slime pumps is very low, about 40% under best conditions and nearer 20% in average practice. This is because of rapid wear of runners and linings and the common fault of over-speeding. The maximum econòmical head for a slime pump is only about half that for the corresponding clear water pump. If the head is high, the wear is very rapid in the clearance spaces until the excessive back leakage finally takes up the entire delivery of the pump.

While undergoing treatment, the pulp is kept in agitation by compressed air or by mechanically revolving arms in the tanks. The latter is the more economical in power consumption, taking only about one-fourth as much as the compressed air method. Mechanical agitators should be carefully adjusted in speed, since the power consumed by them varies approximately as the cube of the speed, provided the speed is always sufficient to prevent settling.

The fact that so many motors are necessarily over-size for the work does not mean, as might be expected, a low power-factor for the mill load as a whole, since the bulk of the load is always on the stamp and tube mill motors, which operate at a very high power-factor. At Goldfield, the power-factor of the mill was actually about 84% at the motors, though this was reduced to about 75% by excessive reactance in feeders and transformers due to improper arrangement; and at Aurora, the power-factor of the mill, excluding the synchronous motor driving the mine air compressor and excluding lights, was 86.3%.

The man who wears a high hat in a snowstorm invites a snowball—we have invited the East to the Pacific Coast. Let us make it worth while for them ——

—— PASADENA — MAY 17-21, 1920



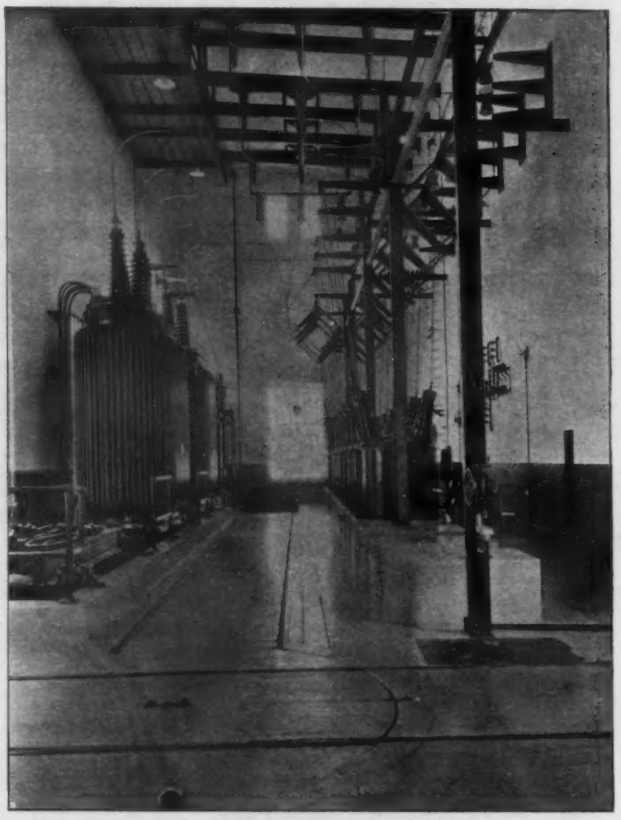
Cedar Falls substation of the Chicago, Milwaukee & St. Paul Railroad, showing two 2000-kw., 3000-volt, direct-current generator sets.

PROGRESS IN RAILWAY ELECTRIFICATION

The recent electrification of the coast division of the Chicago, Milwaukee & St. Paul Railroad completes a total of 647.4 miles of electrically operated lines on this system. The newly electrified section from Othello in central Washington, to Renton Junction on the Puget Sound end, was opened Mar. 5th.

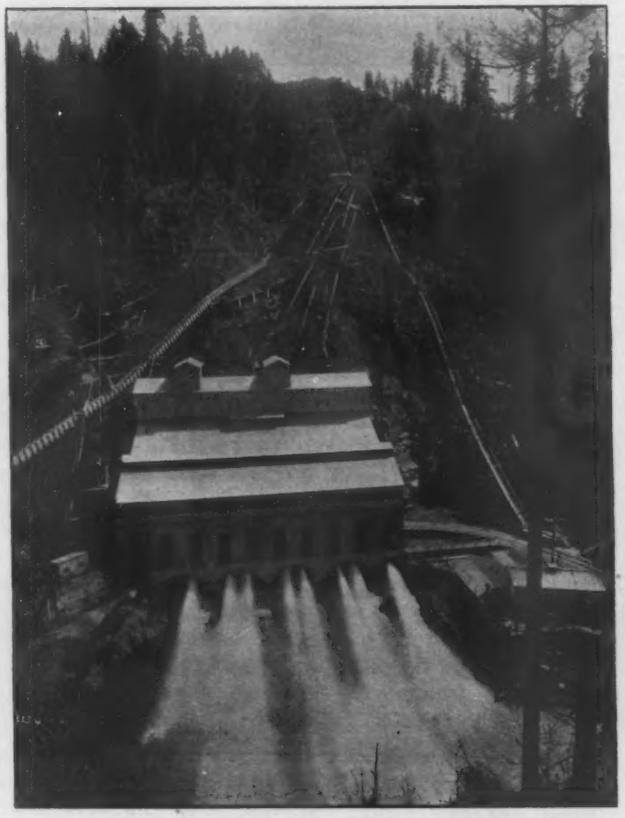
The locomotives used are equal to 2.7 steam passenger locomotives of the latest type and will pull a passenger train of twelve coaches up the heaviest grade on the system at a speed of 25 miles an hour.

All the current used in operation is generated from water power, and supplied from the plants of the Puget Sound Traction Light and Power Company and the Long Lake plant of the Washington Water Power Company. Current is delivered at 100,000 volts and stepped down to 3,000 volts direct current for use on the locomotive motors.



High tension room, Cedar Falls substation, showing two 2500-kva. transformers and 10,000-volt oil switches.

The first electrification of the Chicago, Milwaukee & St. Paul lines (the Rocky Mountain division of 226 miles) was completed and put into operation in December, 1915. When the unelectrified gap between Othello and Avery is closed, there will be a complete electrification extending for over 860 miles.



Electron, the Puyallup River station, where some of the power for the railroad is generated

The new division completes all but a small gap in the entire 860 miles of electrified road

Time—The Fourth Dimension of Space

BY A. H. HALLORAN

(Great interest has been attracted to the consideration of the ultimate constitution of matter due to the possibility of a verification of Einstein's theory brought about by a recent observance of a deflection of light from the stars, in its passage near the sun on its journey to the earth. Dr. Crehore's articles now appearing in the Journal of Electricity have likewise added emphasis to this discussion. Here is a simplified explanation of the Einstein Theory of Relativity that should prove timely and interesting.—The Editor.)

Fifteen years ago Einstein, a Swiss Jewish professor in Berlin, proposed a new theory of motion claiming that Newton's classical laws of gravitation were merely an approximation, and that the theory of an ether-filled space was no longer necessary to explain many physical phenomena. His revolutionary ideas were received with doubt by many prominent scientists at that time. Today, however, two of his most important deductions have been proven by rigorous experiment, and former scepticism has been converted into an eager interest throughout the scientific world.

Einstein's "Theory of Relativity," as it is called, is ordinarily expressed in such intricate mathematical terms that it is incomprehensible to the non-mathematician; yet it is possible to give a brief account of its salient features in language which will be intelligible to the layman. Mathematics is the shorthand of science, a most powerful tool for digging into its problems in the hands of the adept, and capable of being translated into simpler terms when so desired.

No Absolute Motion

The first postulate of this new theory is that all motion is relative, that there is no absolute standard for the measurement of motion. This means that the motion of one body can be defined only with respect to that of another. Motion is merely simultaneous change of position in space and time. This principle is familiar to everyone traveling in a railroad train paralleling a train going in an opposite direction. If the other train is moving and yours is standing still, you frequently feel that you are moving as you look at the passing train. You cannot judge the motion of a smoothly moving train if the curtains are drawn at night, nor could you discover the forward motion of the earth if you could not see the heavenly bodies.

Constant Velocity of Light

Einstein's second postulate is that the velocity of light in free space is independent of the velocity of the observer or of the source. This has been definitely confirmed in experiments conducted by two American physicists, Michelson and Morley, who found that the speed of light is the same whether the earth is moving toward the source of light, away from it or at right angles to it.

The combination of these two simple ideas leads to some startling conceptions as to the theory of the universe, as will be explained after developing the new conception of time and space upon which the theory of relativity is based.

As no one has observed a place except at a time, nor a time except at a place, it has been found necessary in exact physical work to combine the two. If x, y and z be the rectangular co-ordinates of space, corresponding to length, breadth and thickness, and if t represents time, then x y z t represents a point in space at definite time. This substitutes four dimensions for the three with which we are familiar, making time the fourth dimension of space. Instead of thinking of time and space separately, we must think of them together. In the words of Minkowski, the scientist who developed the mathematical statement of this fact, "Henceforth Time and Space in themselves vanish to shadows and only a kind of union of the two preserves an independent existence."

While this unified time-space conception is difficult to grasp at first, a little thought will show that it is logical, and well in accord with our every-day experience. There is nothing more mysterious about the fourth dimension than there is about the other three. A dimension is simply a measurable direction, and we could use a fifth dimension just as easily should occasion require.

Though it is hard mentally to conceive of a fourth dimension in space, this is comparatively easy when the fourth dimension is time. Points that are far apart if measured in three dimensions, may be close together in the fourth,—events may happen at the same instant though hundreds of miles apart.

Suppose that instead of a three dimensional consciousness, you had only a one dimensional consciousness, and that was situated at the surface of a bucket of water. Suppose that a foot rule were gradually introduced into that bucket of water at a uniform rate of speed, the rule having marked on it twelve lines at one-inch intervals. As the rule is lowered into the water your one dimensional mind would be conscious only of a series of twelve lines appearing at regular intervals. Thus a linear foot of "space" will be represented to your one dimensional space consciousness as twelve equal periods of "time." Or suppose that you had a two dimensional space consciousness situated at the surface of the water, and that there was introduced a cylindrical rod on which were marked a series of circles at regular intervals. In this case likewise, you would be conscious only of the successive appearance of the circles at regular time intervals, and time would thus become a third dimension to your two dimensional space consciousness.

The woman who still uses an old-fashioned wash tub is behind the times—but not more so than the electrical man who fails to attend convention ——

—————— PASADENA — MAY 17-21, 1920

The analogy also holds true as regards our present three dimensional consciousness with time as the fourth dimension. We have no difficulty in thinking of the fact that half the earth's surface is in darkness while the other half is illuminated by the sun, and thus the time succession of day and night becomes simultaneous in our mental conception.

Inasmuch as motion is relative, so likewise are its two components, time and space. Time is merely a form of perception by which we express our consciousness of the relative change in things, space of the relative position of things. One is an arbitrary measurement of duration, the other of position. Neither is absolute.

The practical reason why mathematicians prefer to use four dimensional analysis is not only that it gives an exact statement of space-time conditions, but also that the four dimensional language substitutes short, simple and easily attained expressions for the long, awkward and complicated terms that result from laborious calculations in three dimensions. Any student struggling with the complex equations of electro-magnetic phenomena found in the ordinary text book, should welcome the ease of attack afforded by four dimensional analysis. The principle of relativity describes physical phenomena in a simpler and more symmetrical manner than was before possible.

Einstein has so revolutionized our ideas of space and time that there is hardly a branch of science that is not affected by this new conception. Perhaps the most fundamental result of his theory is that it eliminates the necessity for the hypothetical ether of space, which has long functioned as a crutch to aid the understanding of natural phenomena. His clearness and boldness of vision found the ether to be a superfluous hypothesis, though it is only fair to add that he has furnished no evidence either for or against the ether's existence.

The three great principles of physics—the conservation of energy, the conservation of momentum and the conservation of mass,—previously considered to be fundamental, are shown by Einstein to be but special cases of a new principle of extended momentum. Matter and energy are found to be but different aspects of the same entity. When we are concerned with a body's inertia or mass we are dealing with matter; when we are interested in a body's motion we are dealing with energy. When a body is set in motion, both its energy and its mass are increased.

Measuring Kilowatts by the Pound

Matter is proven to be merely condensed energy. This energy is so tightly locked up that there is at present no known method of releasing it for useful work, though it is a possibility of the future which may well be turned to man's benefit, or, mayhap, to his destruction. In radium, the heaviest known element, we see spontaneous partial liberation of energy, the total amount given up being about two hundred and fifty times the energy obtained by burning an equal weight of coal. One gram of matter is calculated by this theory to equal 9×10^{20} ergs of energy, or twenty-five million kilowatt-hours. Thus 1 kilogram (2.2 lb.) of matter contains twenty-five billion kilowatt-hours, or approximately the total output of all electric light and power plants in the United States during the year of 1918.

As Crehore recently has shown in these columns all the laws of gravitation originally developed by Newton can be expressed in an equation which attributes the cause of gravitational force to the electromagnetic action of the moving negative electrons contained within the atom of matter, an electron being a negative electric charge. Newton's law of instantaneous gravitational action, however, is upset by Einstein's deduction that no action can exceed the velocity of light. Inert mass then simply becomes latent energy and the mass of a body at rest is simply the measure of its internal energy. Think of selling kilowatt-hours by the pound!

Physical Quantities Dependent Upon Speed

According to Einstein the shape and size of a body is dependent upon its speed and direction of movement relative to the observer. For ordinary velocities this effect is extremely slight but at a velocity approaching that of light it becomes more marked. The kinematical shape of a rigid body differs from its geometrical shape by a contraction of all its dimensions in the line of motion in the ratio of $\sqrt{1 - \frac{v^2}{c^2}} : 1$, where v is the velocity of the body and c that of light. Thus a sphere relatively becomes an ellipsoid.

A similar deduction holds true with respect to time. The time interval measured by a moving clock must be multiplied by $\sqrt{1 - \frac{v^2}{c^2}}$ in order to agree with measurements made by a stationary clock.

Measurements of length made parallel to the motion of a moving yardstick must be multiplied by $\sqrt{1 - \frac{v^2}{c^2}}$ in order to agree with measurements made in a stationary system; i.e., a stationary observer will obtain a smaller measurement for the length of a moving object than will an observer traveling with that object.

Likewise the mass m of a body moving with a velocity v and having a mass m_o when at rest is $\frac{m_o}{\sqrt{1 - \frac{v^2}{c^2}}}$. The mass or weight of a spinning top is greater than that when it is at rest. The temperature of a moving body, also, must be multiplied by the same factor to agree with measurements made by a stationary observer.

In studying the electromagnetic equations it is found that the electromagnetic forces acting on a moving charge in a magnetic field are nothing but electrostatic forces when measured by an observer moving with the charge.

Einstein's theory explains the shifting of the orbit of Mercury, which could not be accounted for by Newton's theory. It foretold the deflection of light by the gravitational action of the sun, as was definitely confirmed at the last total eclipse. This means that a ray of light has inertia or mass, being attracted by gravity.

A third experimental test of the truth of this theory, the shifting of certain lines of the spectrum toward the red end in a magnetic field, has not yet been accomplished.

Thus the theory of relativity leads to the conclusion that almost all physical quantities are functions of the velocity of a body relative to the axes of reference. The factor $\sqrt{1-\frac{v^2}{c^2}}$ is practically unity in all ordinarily observed phenomena and therefore negligible, but in the case of electrons emitted from a radioactive substance or cathode rays produced by high potentials it is great enough to be taken into serious account.

All statements herein made are susceptible of rigorous mathematical proof as given in several texts. Those best combining clarity of English expression with completeness of treatment are "The Theory of the Relativity of Motion" by Richard C. Tolman, published by the University of California Press, Berkeley, California, and "The Electron Theory of Matter" by O. W. Richardson, published by the University Press at Cambridge, England. To these the interested reader is referred for the mathematical proofs that have been omitted in this attempt at a popular account of the theory.

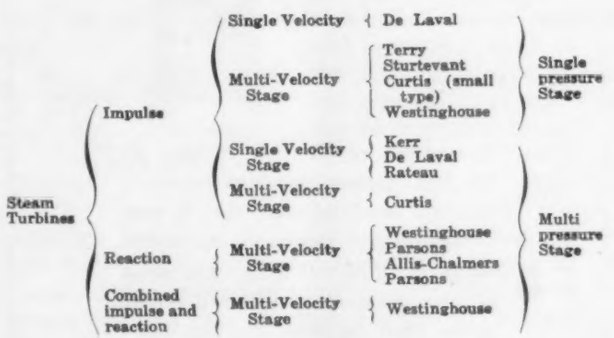
Steam Turbine Characteristics

BY WILLIS T. BATCHELLER

(A thorough knowledge of the classification and structure of the various types of steam turbines is important in the practice of steam engineering. In the second of a series of articles this author, who is electrical engineer with the Seattle Lighting Department, takes up the theory of the single-stage impulse turbine in operation.—The Editor.)

A steam turbine consists of a rotor made up of one or more wheels or cylinders carrying blades or buckets against which one or more jets impinge. Steam turbines are classified as follows:

1. According to the method of steam expansion:
   (a) **Impulse turbines,** with steam expansion only in the stationary blades or nozzles.
   (b) **Reaction turbines,** with steam expansion both in the stationary and in the moving blades.
2. According to the method of subdividing the available energy:
   (a) **Pressure stage turbines,** where the available steam pressure drop is subdivided among two or more successive sets of rotating blades, each set taking care of the drop of pressure.
   (b) **Velocity stage turbines,** where the steam at constant pressure passes through two or more successive sets of rotating blades, starting with a high steam velocity and decreasing the same from set to set.



Single Stage Impulse Turbine

The simplest type of turbine is the impulse turbine having a single set of nozzles through which the steam is expanded, imparting velocity to the jet itself, which impinges against the vanes of a single rotating wheel, giving up its kinetic energy to the wheel.

The distinctive feature about the impulse turbine is that the pressure drop occurs entirely in the nozzle and the pressure is the same on both sides of the wheel. The velocity of the jet is from 2000 to 4000 feet per second and for economy the peripheral velocity of the wheel must be from 700 to 1400 feet per second. This results in a speed of several thousand revolutions per minute, which must be reduced by gears for ordinary applications.

Theory

A given weight of steam at a given pressure and temperature occupies a certain known volume and contains a known amount of heat energy. If the steam is permitted to expand to a lower pressure without receiving additional heat or giving up heat to surrounding bodies it is capable of doing a certain amount of work which will be the same whether the expansion takes place in the cylinder of a reciprocating engine, a rotary piston engine, or the nozzles and blades of a steam turbine.

Using the steam conditions which exist at the Lake Union steam plant, namely 190-pounds gauge and 125° F. superheat, we will make the necessary computations for a non-condensing impulse turbine, exhausting at atmospheric pressure.

When the cook leaves the salt out of the soup you miss something—think of all you would miss if you failed to attend convention ——

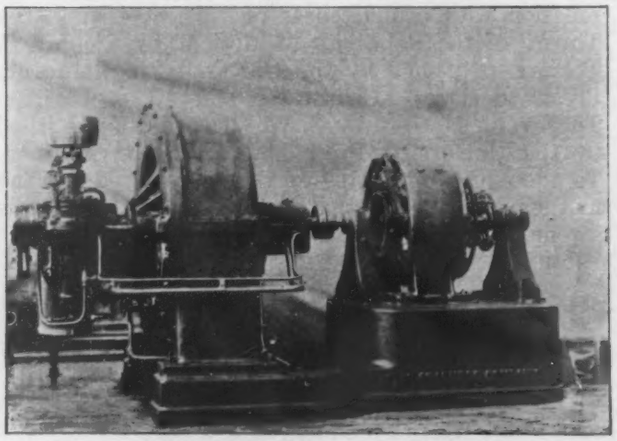
—————— PASADENA — MAY 17-21, 1920

PROPERTIES OF STEAM

Pressure	190 lbs. ga.	0 lbs. ga.	0.732 lbs. abs. or 28½ in. vacuum
Temperature	511°	212°	91.70°
Specific Vol.	2.71 cu. ft.	26.79 cu. ft.	446.2 cu. .ft.
Heat of Liquid		180.00 B.t.u.	59.70 B.t.u.
Total Heat of Steam	1270.5 B.t.u.	1150. B.t.u.	1100.0 B.t.u.
Heat after adiabatic expansion		1065. B.t.u.	890. B.t.u.

Under these conditions

the initial heat contained in 1 lb. steam is 1270.5 B.t.u.
the final heat is 1065. B.t.u.
the heat drop is then $1270.5 - 1065 = 205.5$ B.t.u.



50-kw. Allis-Chalmers impulse turbine and generator exciter set at Lake Union steam-electric station, city of Seattle.

If the steam expands in the cylinder of a reciprocating engine, the energy given up in forcing the piston forward is

$E = 777.5\ (1270.5 - 1065.) = 82{,}026$ ft. lbs. per lb. of steam.

If the steam expands within a perfect nozzle the energy will be given up in imparting velocity to the steam itself, and

$$E_2 = \frac{V_1^2}{2g} \text{ ft. lbs. per pound of steam}$$

If the velocity of the jet is retarded to V_n feet per second, as by placing a series of vanes in its path, then the energy given up to the vanes, neglecting all losses, is

$$E = \frac{V_1^2 - V_n^2}{2g} \text{ per pound of steam.}$$

If the kinetic energy is completely absorbed by the vanes, then $V_n = 0$ and the energy given up is

$$E_3 = \frac{V_1^2}{2g}.$$

Since $E_1 = E_2$

$$777.5\ (H_1 - H_n) = \frac{V_1^2}{2g}$$

$$V_1 = 223.8 \sqrt{H_1 - H_n}$$

Substituting quantities from steam conditions assumed in problem,

$$V_1 = 223.8 \sqrt{1270.5 - 1065}$$
$$= 223.8 \sqrt{205.5}$$
$$= 223.8 \times 14.34$$
$$= 3210 \text{ ft. per sec.}$$

Using a peripheral velocity of the turbine rotor of 1000 feet per second, and a mean diameter of three feet, the turbine speed will be

$$\frac{1000}{3 \times 3.1416} = 106.1 \text{ rev. per sec.}$$

$$= 6366 \text{ r.p.m.}$$

The theoretical horsepower developed by a jet of steam flowing at the rate of one pound per sec. may be expressed: $\frac{E}{550} =$

$$= \frac{V_1^2 - V_2^2}{2g \times 550} = \frac{3210^2 - 1310^2}{2 \times 32.2 \times 550} = \frac{10{,}304{,}100 - 1{,}716{,}000}{35{,}420} =$$

214 hp.

Steam consumption per horsepower hour,

$$W = \frac{3600}{214} = 16.8 \text{ lbs.}$$

Heat consumption per horsepower per sec.

$$= 16.8\ (1270.5 - 180)$$
$$= 16.8 \times 1090.5$$
$$= 18{,}320 \text{ B.t.u.}$$

Thermal efficiency

$$E_t = \frac{H_1 - H_n}{H_1 - J_n}$$
$$= \frac{1270.5 - 1065}{1270.5 - 180}$$
$$= 0.188 \quad \text{or } 18.8\%.$$

Rankine cycle ratio

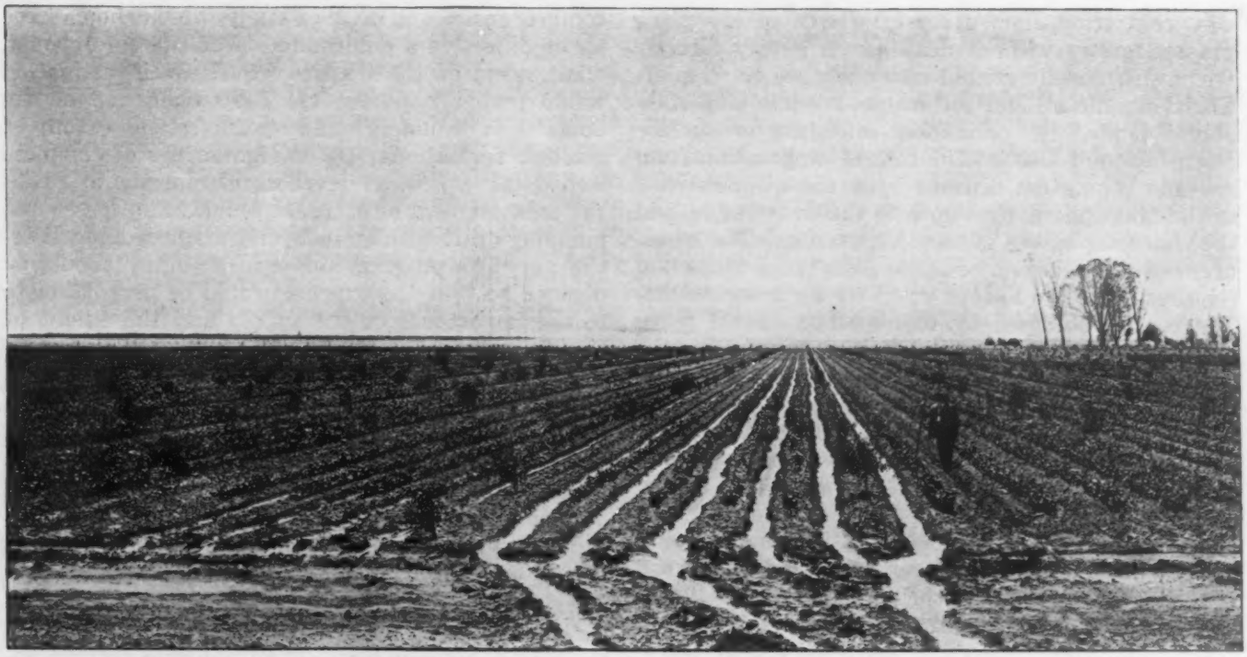
$$E_r = \frac{2546}{16.8\ (1270.5 - 1065)}$$
$$= \frac{2546}{7374}$$
$$= 0.345 \quad \text{or } 34.5\%.$$

Under the above conditions a commercial impulse turbine would have a water rate of about forty pounds per horsepower hour.

The actual Rankine cycle ratio would be

$$E_r = \frac{2546}{40\ (1270.5 - 1065)}$$
$$= 0.31 \quad \text{or } 31\%.$$

The series on The New Physics, by Dr. A. C. Crehore, has been suspended for this issue in order that it may extend through the special convention issues in April and May. The ninth of these important articles will appear in the April 1st issue.

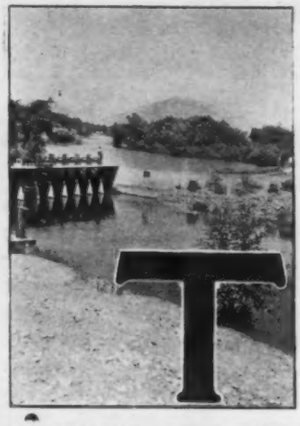


If electric pumping drains the reservoir, gravity irrigation tends to replenish it. The effect of irrigation on the water table is shown by the fact that since the great increase in the use of irrigation in the vicinity of Fresno, the water table of that district has risen 50 inches.

Conserving the Water Table in Electric Pumping

BY CHAS. H. LEE

(The relation of ground water supply to the electric pumping load was discussed in the first part of this article, published in the Feb. 15th issue. In the continuation below, it is pointed out that some of the areas pumped already show signs of depletion, and that underground supplies must be conserved if the load is to be a permanent one. The various steps necessary to attain this end are considered. The author is president of the California State Water Commission. —The Editor.)



Gravity irrigation of the foothill region is a safeguard to the water supply of the valley below served by electric pumping.

THERE are four recognized methods used to determine the annual inflow or re-charge of an underground reservoir. These are known as the intake, discharge, water-table and underflow methods. The first consists in measuring the quantity of surface water that is absorbed and percolates down to the plane of saturation; the second in measuring the ground water that escapes through springs and by evaporation from soil and vegetation; the third in observing the fluctuations of the water table which represent the filling or drainage of the ground water reservoir; the fourth in measuring the flow of ground water at selected cross sections.

Choice of Method

The intake method is most useful in arid regions where mountain streams flow out over gravelly, alluvial cones, losing water rapidly as in the San Bernardino Valley; or where the supply comes largely from one stream, as on the Niles Cone. Stream gagings at the point where streams enter the valley, and at one or more stations lower down in the valley, furnish information as to absorption. Minor amounts may also be absorbed from direct rainfall or from small tributary drainage areas. This method does not indicate the extent of unavoidable losses from ground water and is not to be depended upon where the safe yield of the reservoir is desired.

The discharge method is also best adapted to arid regions or to regions in which precipitation is confined to the winter months. In humid regions, it is difficult to differentiate between evaporation losses through soil and vegetation, as to whether the water is derived from temporarily absorbed rainfall or from permanent ground water. There is also the necessity of distinguishing between direct runoff and ground water runoff in streams. In arid regions, however, the problem is relatively simple. Spring flow and seepage inflow into streams can be readily measured by ordinary stream gaging meth-

An interview with her father has inspired many a young man to go to work—the inspiration which convention affords will mean much to the work of the electrical industry in the West ——

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ods. No vegetation, except the ephemeral spring grasses, grows without drawing its supply directly from a permanent ground water surface or from artificial irrigation, and soil evaporation is unmistakably indicated by permanent moisture or surface incrustation of alkali. The rate of evaporation from soil and vegetation depends upon the evaporativity of the atmosphere, the depth to the water table, and the character of the soil and vegetation. The measurement of losses can be made from large tanks and requires from two to four years for accurate results. The results obtained by this method should serve as an independent check on those obtained by the intake method, and in addition furnish data upon which to base safe yield estimates.

The water table method is especially well adapted to California conditions where there is a rainy season during the winter when most of the replenishment occurs, and a dry season in the summer when withdrawals by evaporation and pumping for irrigation occur. The average annual rise of the water table multiplied by the percentage of available pore space and the area of the water table for a given underground reservoir, gives the annual increment to ground water supply. There are various details which must be considered in making the field observations and computations therefrom which need not be discussed here. In general, however, the method is most reliable when applied to basins filled with open, porous and somewhat uniform material without inter-bedded clay formations and with flat slope of the water table. The greatest difficulties in the application of this method are in determining available pore space, and in distinguishing between general use of the water table and rise in wells due to pressure.

The underflow method consists of determining the rate at which water is percolating through a selected cross-section of porous material. It involves the measurement of three factors: (1) The area of the cross-section; (2) the velocity of the percolating waters; and (3) the porosity of the material. The latter is usually the most uncertain factor. The velocity can be observed with a fair degree of reliability by the Slichter electrolytic method. This method has a very restricted use for making determinations of re-charge or discharge, as the only condition under which it can be applied is where water percolates along a definite course, such as a narrow stream valley bordered by impervious formations.

Practical Applications

There are three problems which may be presented to the management of a power system in connection with electric pumping.

First: Will a given untried district provide sufficient permanent pumping business to justify the investment necessary to serve it? The answer can often be obtained by an experienced hydrologic engineer during the course of a short field investigation. At most the cost of such an investigation would be a negligible percentage of the investment.

Second: Should service be actively extended in a given occupied district? This requires a more comprehensive and detailed study, which should have as its objective a determination of the safe ground water yield of the district. Such an investigation would probably involve (1) the tracing out of the boundaries of underground reservoirs and a study of geologic formations; (2) the gathering of complete well data; (3) water level measurements in wells; (4) measurement of natural ground water losses and pumping draft with an independent check against recharge. The program for such a survey should be planned so that the expense would be proportionate to the importance of the supply and the extent of the company's business.

Third: What should be done to improve the situation in an occupied district where water levels are persistently falling? There are several policies to be followed, all of which require more or less education of the public and cooperation with local development organizations and land owners.

If the district overlies an underground reservoir within which artesian pressure exists with flowing artesian wells, very effective results may be obtained by capping such wells and preventing waste when the water is not in use. The California statute approved March 6th, 1907 (Genl. Laws, D.K. Act. 4356; and Deering's Penal Code, p. 752), provides for the prevention of such waste and prescribes penalties therefor, but the initiative in prosecuting offenders must be taken by county officials, and opposing or indifferent local public opinion may have a deterrent effect. In one county, the district attorney appoints a deputy who inspects all flowing artesian wells during the non-irrigating season and reports all violations of the law. Marked improvement in water levels and artesian flows were observable in this county within two years after enforcement of the law commenced. A more general enforcement of the law would doubtless result if administered by a state office.

An artesian well on a ranch, flowing 37 in. and now being pumped by a 15-hp. motor and 6-in. pump, is giving up about 80 in. of water. One of the methods of conserving the underground water supply is to cap these artesian wells during the non-irrigating period.

If the district lies within an underground reservoir, fed by torrential mountain streams with large gravel cones including waste land, very good results

The man who tastes an olive as it comes off the tree learns something—the electrical men who attend this spring's convention will learn many things of importance——

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may be obtained by "water spreading." This consists in diverting the winter flow of the streams during falling stages and between storms and leading it onto the adjacent gravel slopes in contour basins, or spreading it out in many small heads in order to increase the absorption and so increase the annual ground water re-charge. This method is being extensively used in the valleys of Southern California and with marked success. The work is done by an association of the water companies which receive the greatest benefit.

If the streams are not torrential and little or no waste land exists, as along the East side of the San Joaquin and Sacramento Valley, the same result can be accomplished in another way, namely, by gravity irrigation of upper-slope and foothill lands with natural flow and storage water, and as far as possible the irrigation of mid-slope and lower lands by pumping from wells. The seepage losses from irrigation, especially on the more open soils of the upper slopes, are unavoidably large and constitute a permanent source of ground water supply for the lower lands. In this connection the efforts of local communities to accomplish foothill storage of winter and flood waters may well be encouraged, and also the gravity irrigation of upper lands. The logical zone for permanent irrigation pumping is the center and lower slopes of the valley, where there is a tendency to water-logging and alkali accumulation at the surface. With intelligent distribution of shallow well pumping plants in such a region, there is possible not only the development of a permanent ground water supply by pumping, but the drainage of the land and control of alkali conditions. Large opportunities lie open to development of this character on every stream delta along the east side of the great valley.

The logical place for the permanent pumping service is in the low lands where there is a tendency to water logging and alkali accumulation. The picture shows a drainage plant in the vicinity of Fresno, and indicates the leaching of the land of alkali through electric pumping.

Public Supervision

The methods suggested above for conserving and replenishing ground water supply can generally be worked out through local effort and cooperation. The only effective manner in which overdraft from an underground reservoir can be prevented, however, is by limiting development and use. Such regulatory power can best be exercised by the state, and should be comprehensive and effective.

First, the regulatory body should have authority and be provided with funds to make investigations and studies of ground water resources and underground reservoirs throughout the state. Such investigations might well be carried on with the twofold purpose of giving a basis for administrative action and furnishing information to the public in the form of printed reports useful to land owners or prospective investors.

Second, there should be supervision of all new ground water development, the drilling of irrigation, municipal or industrial wells being allowed only under permit from the State. The regulatory body should also have authority to make ascertainments of all pumping rights initiated prior to the enactment of the authorizing legislation.

Third, the necessary administrative machinery should be provided to supervise the use of ground water, to observe water levels in the various underground reservoirs, and to close down pumping plants in accordance with the established and recorded priorities whenever overdraft was occurring, until a condition of equilibrium of the water plane was established. The latest priorities might be able to pump in wet years, but not during a series of dry years. The supervision of artesian wells and prevention of waste therefrom might also be included in the administrative duties of such a body instead of being left to haphazard local action as at present.

The program outlined above is not without precedent, being followed in several Western states. It is in fact the same procedure as is prescribed in the Water Code of Oregon for surface waters where it has proved eminently satisfactory. The California Water Commission Act at present specifically excludes underground waters except "subterranean streams flowing through known and definite channels." The latter are practically negligible as sources of economic ground water. With public control of ground water development, the permanency of the electric pumping load in an otherwise doubtful district might be regarded with some assurance.

Summary

In conclusion it may be stated:

1. That the sources of supply, for electric pumping from wells, are underground reservoirs, underlying the valleys and coastal plains of the state.

2. That certain of these underground reservoirs are unfavorably situated with reference to sources of replenishment and are being over-pumped with resultant lowering of the water level; that certain others are more favorably situated, but with pumping have experienced a temporary lowering during the past two years, due to exceptionally light rainfall and runoff; and that a third class, because of very favorable replenishment conditions or small pumping

Capt. Cook failed to get to the North Pole—no electrical man who wishes to keep up with progress should fail to attend the spring conventions ——

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draft, have not experienced noticeable lowering of the water level.

3. That there is no general lowering of water level throughout extended areas of the state, but that each underground reservoir is a special case by itself, the persistent lowering of water levels occurring only in those underground reservoirs where the pumping draft exceeds the rate of replenishment.

4. That it is practically possible for trained ground water hydrologists to ascertain the boundaries of underground reservoirs and determine with a certain degree of accuracy their annual re-charge and safe yield.

5. That there are methods of increasing and conserving the natural supply of underground reservoirs which local investigation may often reveal.

6. That the management of hydroelectric power companies engaged in irrigation pumping might well shape their future policies in the light of information thus obtainable.

7. That state supervision of the development and use of ground waters, with power to prevent too extensive pumping development and to stop waste, would work to the interest of both land owners and public utilities which supply power for pumping from wells.

The Record of 100 Dam Failures

BY LARS JORGENSEN

(Electrical development in the West is mainly dependent upon hydroelectric projects involving extensive harnessing of the natural water powers. In view of the large number of such projects affecting both the water and power supply of the Pacific Coast, the following records relating to dams are of considerable interest. The author is a prominent San Francisco engineer. The second installment of this compilation follows in an early issue.—The Editor.)

During the past ten years the writer has paid considerable attention to the various causes responsible for over 100 dam failures. These failures have been recorded from time to time in engineering magazines, which fact has largely contributed to the improvement of the art.

For the benefit of others, a list will be given below of more than 100 dams that have failed, including a short description of when and why they failed, and, in most cases, their principal dimensions. Reference will also be given where possible to periodicals wherein a full description of the conditions leading up to the accident can be found.

The Calaveras dam near San Francisco, of the hydraulic earth fill type. The middle section of the upstream side pushed into the reservoir during construction, the clay core exerting an outward pressure towards the bottom on account of the great height and softness.

All conceivable types of dams are included in the list with the exception of the pure arch dams. Of dams of this type the writer has not been able to find the record of a single failure, although there are a number of freak dams among this type. For instance, one arch has the alignment so seriously at fault, that the radius at the top varies from a minimum of 58 ft. to a maximum of 80 ft. The dam section is only 3 ft. thick for the upper 40 ft. Some existing arch dams are exceedingly highly stressed, more so than any other type of dam, and are nevertheless intact.

One gravity dam polygonal in plan upstream failed by undermining. It was built on piles in a gravel bed. After the failure the dam presented the appearance of a bridge whose abutments were standing on the hillside, and whose openings were about 56 feet broad by 108 feet high.

Earth fill dams seem to fail quite freely. The cause seems mostly to be water going over the crest or seeping under the cut off wall. Rock fill dams fail on account of similar causes. Reinforced concrete dams generally have failed by the water undermining the structure.

RECORD OF DAM FAILURES
EARTH DAMS

1873—Conshohocken Hill Reservoir near Philadelphia, Pa. Bottom lined with 18-in. clay, upon which was laid a brick paving in cement. Bottom lining broke away in 1873. It was repaired and failed again in 1876-1879-1886.

1874—May 16th—Mill River Reservoir Dam, Williamsburgh, Mass. 600 ft. long, 43 ft. high, 16 ft. wide on top. Slopes on both sides 1½ : 1. Core wall 2 ft. thick at top, 5 ft. 9 in. thick at bottom. Earth with masonry core wall. Water found its way under the core wall. Loss, 140 lives and $1,000,000 damage.

1876—March 20th—Lynde Brook Reservoir, Worcester, Mass. 287 ft. long, 27 ft. high, 25 ft. wide on top. Earth with rubble masonry on inside face. Water leaked around culvert passing through embankment. Damage $1,000,000.

1877—March 27th—Staffordville, Conn. 150 ft. long, 26 ft. high. Earth with masonry face wall, 10 ft. at base and 4 ft. at top. Water leaking along waste pipe. Some lives lost; damage, $300,000.

1882—July 10th—Lebanon, Ohio. 30 ft. high. Earth. Water flowing over crest.

1886—April 20th—Mud Pond Dam, East Lee, Mass. 325 ft. long, 15 ft. high; 28 ft. thick at base, 6 in. on top. Earth with a dry boulder wall on the down stream side. Poorly constructed. Seven lives lost. Damage $250,000.

1888—November 10th—Roanoke, Virginia. Earth. Bottom settled and caved in.

1888—February 2nd—Rock Springs Water Works Reservoir, Blairtown, Wyoming. Water leaking around a pipe laid through dam.

1889—May 31st—Johnstown, Pa. 72 ft. high, 20 ft. wide on top. Earth and clay. Inside slope 2 : 1; outside,

1½ : 1. Inside slope protected with light riprap. Water overflowing crest. Loss of life between 4,000 and 10,000. Damage $9,000,000. Engineering Record, June 8th and 15th, 1889.

1889—August 25th—Spring Lake Reservoir, near Fishville, Rhode Island. 825 ft.; 18 ft. high, 35 ft. bottom and 8 ft. top. Clay and gravel. Inner slope paved with stone. Portion washed away was just above the waste pipe. Three lives were lost. Engineering Record, August 31, 1889.

1890—May 21st—Gunnison, California. Reservoir 20 ft. deep. Leaks along drain pipe.

1890—April 10th—Nebraska City, Nevada. Two reservoirs failed. Earth, 8 ft. wide on top. Slope 1 : 1 inside—1½ : 1 outside. Depth of water 17 ft. Soil very porous. Lined with 2-in. plank covered with 1 ft. of earth.

1891—June—Dallas, Texas. 29 ft. high, 12 ft. wide on top, with an inner slope of 2 : 1. Clay without core wall. Inner slope paved with brick in cement set on edge upon 3 in. of gravel. Settled vertically from toe to outer slope for a length of 300 ft. Brick and cement lining cracked.

1892—June 4th—Spartansburg Dam near Oil City, Pa. 180 ft. long, 10 ft. high. Earth and rock. Water running over crest of dam.

The Lower Otay dam which is situated near San Diego, is of the rock filled type. This failed in January, 1916, when water overtopped the structure.

1893—August—Portland, Maine. Earth. Slopes 1½:1 on each side. 6 ft. on inner slope was puddled clay and 6 in. of broken stone. Water following drain pipe. Five lives lost. Engineering Record, August 19, 1893.

1893—August — Milburn Reservoir, Brooklyn, N. Y. Puddle bottom of reservoir leaked. Engineering Record, April 28, 1894.

1894—October 14th—Lancaster, Pa. Earth with puddle center. Water leaking around outlet pipe. Engineering Record, October 27th and December 8th, 1894.

1894—December 13th—Portland, Oregon. Concrete lining failed. Engineering Record, Feb. 2, 1895.

1894 — Roxborough Reservoir, Philadelphia Water Works. Depression in embankment. Clay washed away and water escaped. Cost $140,000 to reconstruct interior lining. Engineering Record, January 12, 1895.

1894—May—Lima, Montana. Spillway washed out; left dam intact.

1894—May 25th—Avoca, Pa. Insufficient spillway.

1894—November 3rd—Ansonia, Conn. Making a gap 200 ft. long, 35 ft. deep. Water percolating along waste pipe laid through dam. Engineering Record, November 10, 1894.

1894—October 1st—Philadelphia, Pa. Queen Lane Reservoir. The bottom was lined with 4 in. of concrete upon a layer of clay puddle 2 ft. thick. Water leaked out. Cost of reconstructing interior lining, $275,000. Engineering Record, December 22, 1894.

1896—Montreal, Canada. Masonry wall backed first by puddle and then with an earth and stone embankment.

1897—Melzingah Reservoirs Nos. 1 and 2, New York. Both dams failed. Upper dam 250 ft. long, 30 ft. high, failed first. Lower dam 220 ft. long, 24 ft. high. Earth with masonry core wall. Water over crest. 7 lives lost. Engineering Record, July 17, 1897.

1900—July 2nd—Grand Rapids, Michigan. Earth with clay core lined on the inside with rubble masonry. Water 25 ft. deep. Water coming over top of dam. Damage $100,000. Engineering Record, July 14, 1900.

1900—October — Wilmington, Delaware. Earth lined with clay and faced with brick. Leakage of water along pipes laid through bank. Engineering Record, October 20, 1900.

1901—April 21st—Middlefield, Mass. 500 ft. long, 20 ft. high, 50 ft. base, 30 ft. top. Earth faced with rubble walls. Water overflowing crest. Engineering Record, May 4, 1901.

1901—May 19th—Victor, Colorado. 430 ft. long, 25 ft. high. Earth dam. Inadequate spillway. Engineering Record, June 8, 1901.

1901—October 31st—East Liverpool, Ohio. Lined with 18 in. of concrete laid on 27 in. of puddled clay. Break over pipe laid through embankment. Engineering Record, November 2, 1901.

1901—West River Providence (2 dams). Both composed of fine gravel and sand. Water over crest close to wooden sluice way.

1903—April 11th—Bonney Irrigation Reservoir, Delto, Colo. Earth dam. Break in dam over 100 ft. long. Depth of water, 34 ft. Engineering Record, April 25, 1903.

1903—February 22nd—Shelton, Conn. Earth fill with masonry down stream wall of a batter 1 in 10. Failed near spillway. Muskrats burrowing in embankment and water finding its way under the masonry wall. Engineering Record, February 28, 1903.

1903—July 5th—Jeannette, Pa. 300 ft. long, 20 ft. deep. Earth fill. 15 ft. wide on top. 1 : 2 side slopes. Spillway could not carry run-off and water overtopped dam. 40 lives lost. Engineering Record, July 11, 1903.

1904—October 1st—Lake Avalon Dam, near Carlsbad, N. M. 1380 ft. long, 48 ft. high. Composite structure of loose rock with earth on upstream side. It failed by water forcing a passage through the dam, not by overflowing. Engineering News, July 6, 1905.

1904—July 17th—Water Works Dam at Scottdale, Pa. 60 ft. high. Earth rolled in 6 in. layers. Water working through dam at one end. Faulty design, no core wall. Engineering News, August 4, 1904.

1905—September 3rd—Norwich, N. Y., Sherburne Water Works. 2 earth dams. Upper dam 300 ft. long, 34 ft. high. Earth with puddle core. This was overtopped by flood and washed out. Water went to lower reservoir and partly washed out lower dam. Engineering News, September 14, 1905.

1905—June 21st—Ithaca, N. Y. Low dam on Six Mile Creek, 15 ft. high. Failed during great flood. Engineering News, June 29, 1905.

1905—August—Bridgeport, Conn. Hydraulic Company. Earth dam. Spillway too small. Water overflowed top of dam. Engineering Record, August 12, 1905.

1905—July—Leroux Creek, Colorado (2 dams). Earth. 25 ft. high. Water overflowed due to spillway being too small. Engineering Record, July 22, 1905.

1905—September—Ketterling, England. Settlement in earth dam while being built. 12 ft. wide on top; inner slope 1 : 3; outer slope 1 : 2¼; maximum height 46 ft. Puddle core settled. Engineering Record, September 30, 1905.

1907—March 18th—Yuba River, Cal. Debris Barrier No. 1. Hydraulic fill, anchored by piles, rock and concrete facing. 630 ft. of the dam was carried away in a great flood. Water was 7 ft. above crest. Engineering News, August 8, 1907.

1907—June 5th—Cache la Poudre River Dam near Fort Collins, Colorado. Engineering News, June 27, 1907.

1909—September 5th—Blue Water Dam in the Zuni Mountains, New Mexico. Rock fill with earthwork apron and a central puddle wall carried to bedrock. 325 ft. long, 35 ft. above stream bed. Water overtopping the dam. Engineering News, September 30, 1909.

1909—May 20th—Mecaxa Hydraulic Fill Dam, Mexico. Earth dam with clay core. 190 ft. high; upstream slope 3 : 1,

Father, on coming in contact with a rocking chair in the dark, swore—swear now that you will come in contact with the big men of the industry at Pasadena ——

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down stream slope 2 : 1. Soft clay core bulged out before dam was finished. Engineering News, July 15, 1909.

1909—September 6th—Zuni Black Rock, New Mexico. Hydraulic earthfill and rockfill. 720 ft long, 70 ft. high. The dam was undermined. Engineering News, December 2, 1909.

Sheffield, England—Dale Dye Dam. Earth fill with puddle core; 1254 ft. long, 95 ft. high. Both slopes 2½ : 1. Poor design. Wegmann.

1910—March 7th—Credit River, Ontario, Canada. Earth dam with concrete core, 700 ft. long. Failure caused by flood. Dam was being constructed and flood water could not be carried away fast enough. Engineering News, April 14, 1910.

1911—October 6th—Black River Falls, Wisconsin. Dells and Hatfield dams. The two earth dams failed on account of water flowing over top of dam. Engineering News, October 10, 1911.

1912—March 15th—Winston, N. C., Water Works Dam. Earth and masonry. 24 ft. high. Insufficient spillway and poorly constructed. Engineering News, April 11, 1912.

1912—February 10th—Union Bay, B. C. Earth fill over a log crib. Very poor design and construction. There were no trenches in the foundation. Dam was overtopped and disintegrated.

1912—April 7th—Toronto, Canada. Earth fill with concrete core 35 ft. high and buttressed; 700 ft. long. Dam was overtopped and washed out for 130 ft. Engineering Record, April 27, 1912.

1912—May 28th—Ansonia, Conn. Earth fill with concrete core. Water forced its way beneath the retaining wall.

1912—April 23rd—Dalton Dam near Mineville, N. Y. Earth fill with core wall. Water worked its way through a sand bank against which one end of the structure rested and undermined to a depth of 10 ft. the glacial drift beneath the dam, a considerable section of which was destroyed.

1912—April 8th—Lebanon, Pa. Earth fill without core wall. Failed April 8th. A slip on the outer slope of some 140 cu. yards. This was due to softening by rain. Engineering Record, August 24, 1912.

1912—June 22nd—Colorado Springs. Earth fill (disintegrated granite) without core wall. Strong seepage through the dam was followed by caving and slipping of the outer slope. The water had to be lowered. Engineering Record, August 24, 1912.

1912—September—Hornell, N. Y. Earth fill with core wall. Partial failure in September, 1912, consisting of numerous leaks through the foundation. The leaks developed in spite of the fact that the core wall had been carried into the rock.

1914—February—Horse Creek Dam, Colorado. Earth fill with concrete facing; inner slope 1 : 1½, outer 1 : 2½; 16 ft. wide on top, max. height 65 ft., length 6,600 ft. Probably seepage under dam. 250 ft. went out. Engineering Record, Feb. 14, 1914.

1914—February—Washita Dam at Paul Valley, Okla. Concrete core wall was undermined and washed out in February. Structure was about 12 ft. high. The break is 35 ft. long. This is the third time that the power company dam has been washed out. Engineering Record, March 7, 1914.

1914—May 2nd—Hebron Earth Dam, New Mexico on the Chico Rico Creek. 3700 ft. long, 56½ ft. high. Failed May 2nd. Water found its way through gopher holes and finally washed out a gap 200 ft. wide and 31 ft. high.

1914—May 26th—Hatchtown Dam. Earth fill 60 ft. high. Reservoir contained 12,000 acre-ft. The wave crest of the water sweeping down the valley was 30 ft. high; destroyed ten or fifteen smaller dams in its path and was finally caught by the Piute reservoir, the level of which was raised 4 ft. Puddle core.

1914—July—Turlock Irrigation District, California. Davis reservoir embankment, 39 ft. depth of water. Water was just turned in. Leakage around outlet structure finally broke earth embankment. Damage $50,000. Engineering News, July 9, 1914.

1914—July 11—Lake George Dam on South Fork of Platte river, 20 miles above Lake Cheeseman. Water found passage between the earthfill and the original surface near one end. Reservoir contained 2000 acre ft. of water. Engineering Record, July 11, 1914.

1915—Feb. 1—Mohawk Fishing Club dam, near Tiffin, Ohio, failed twice, March, 1913, and Feb. 1, 1915. Earthfill, 400 ft. long, 18 ft. high. Wooden spillway too small, and flood water washed out large section about midway between banks. When dam was rebuilt a 4-in. reinforced concrete coat was given to both faces and the top. Earthfill settled and concrete lining broke away. Water then washed the dam out again. Engineering News, June 10, 1915.

1918—March—Calaveras Dam, near San Francisco, Cal. Hydraulic fill dam to be ultimately 240 ft. in height; 1300 ft. long. Upstream slope 3 : 1; downstream 2½ : 1. Middle section of upstream side pushed into the reservoir during construction. Clay core exerting outward pressure towards the bottom due to the great height and softness of same. Engineering News Record, April 4, 1918.

THE HOUSE ORGAN

(The commercial success of any nation as well as any business house depends largely upon the extent and efficiency with which useful business information is distributed. A prominent advertising manager explains here that the house organ is the logical and most effective means of accomplishing this end.—The Editor.)

"Great friendships are never formed except on the basis of mutual benefit. This applies to the relations between the individual and what he reads just the same as it does to personal relations between individuals. By the same token, it applies to the relations between a commercial institution and its customers and prospects. The house organ is merely one effective means of establishing a satisfactory friendship in bulk. That friendship begets confidence and then business."

Such was the declaration of an Eastern advertising manager in addressing the financial advertising section of the advertising convention. He explained that a house organ can do two things: it can build good-will, and can carry a direct selling message. Which elements shall predominate will depend largely upon whether the firm thinks in terms of service or in terms of sales.

In spite of the age and persistence of the house organ idea, there are many who do not believe that this type of publication can be justified as a factor of value in advertising. The chief contention of these critics is that house organs come into being and disappear in considerable numbers every year, and therefore have too great an element of weakness to be relied upon. Their estimates of the house organ death rates are undeniably true but there is considerable doubt about this being a logical reason for not using house publications where there appears to be a logical field for them. Nations rise and fall but no one in his right mind would use that fact as an argument against the nation so-called, as a desirable political unit.

Some one has aptly said that every doctor, lawyer, advertising man, or any other person engaged in similar work should devote a portion of his time to the upbuilding of his profession. Otherwise progress is impossible. By the same token every legitimate business institution should devote some of its time and money to the upbuilding of business. It not only owes this time and money to its customers and prospects individually but to the nation as well. Finally, in speaking of the form which a house organ should take, this advertising manager said that the firm planning to issue one should above all consider a fact which all leading magazines have learned, through actual experience, namely, that a magazine should always be edited largely along lines suggested by its readers.

Public Utility Rates as Affected by Fluctuating Unit Prices

BY C. E. GRUNSKY

(The dollar is unquestionably worth less today. To what extent should the public utility be allowed an increased return—and should this be reckoned in by substituting replacement costs for original investment or by allowing a larger percentage of return to the power company on the former valuation figures? A radical stand which nevertheless offers a possible practical solution of the difficulty is here taken by an eminent valuation expert.—The Editor.)

The law as interpreted by the courts requires that value be taken into account when the sufficiency of a public utility rate is in question. The public service commissions of the country endeavoring to make value the rate base, now find themselves embarrassed in selecting a proper standard or norm of value. The dollar of course—but the dollar of 1919 when measured in commodity units or by its purchasing power is only worth 43 per cent as much as it was, on an average, during the first decade of this century and only 33 per cent as much as it was in 1896 and 1897.

Difficulties in Determining Value

When now the question is presented how much it would cost in money to reproduce a plant, such reproduction cost being a more or less dependable index of value, it becomes a perplexing problem to select the unit prices which are to be used in estimating this cost. The reproduction cost is ordinarily wanted as a means of determining or judging value at some particular time. Perhaps, therefore, no more satisfactory unit costs can be selected for introduction into the estimate, than such as are normal at the time to which the valuation is to apply. But, what are normal prices? Those which prevailed during the period of construction may lead to a fair estimate of the investment but they may not be at all satisfactory elements with which to compute present value. Or, if a present or recently past period be selected as one during which the plant could be reconstructed, what date or period of time is to control the price schedule?

The valuation expert is generally inclined to use the average prices which have prevailed for some years prior to the time to which the valuation is to apply. He has not, heretofore, had to deal with such phenomenal price changes as those of the last few years. A five year period has been customary, a ten year or other long, more or less indefinite period has sometimes been taken. If the future trend of prices could be forecast with some certainty the appraiser would no doubt like to make use thereof as a help in determining the momentary normal, because, generally, the established rate base and the rates are to be fixed for some definite or indefinite period in the future. When this is the case, why not accept all prices as momentarily prevailing? This may, theoretically, be sound doctrine but the prices momentarily prevailing are more or less accidental, they are rarely normal, and they are not satisfactory for application to a period of considerable duration such as a year or several years, or even a much longer period which might elapse if reproduction of a plant were actually undertaken; nor are they satisfactory as a forecast for a future term during which the rates based on the valuation are to prevail.

A Commodity Unit Suggested

The suggestion is ventured, in these circumstances, of a procedure which will be equivalent to the substitution of a commodity unit for the dollar as a standard of value. Suppose, for example, that a price scale applying to any selected period shall have been made the basis of a reproduction cost estimate and that the relation be then found which prices of materials and commodities in general during that period, bear to the prices prevailing at the time for which the reproduction cost is to be estimated. This relation can then be used as a correction factor, and a fair estimate of the reproduction cost will be available for any instant of time or for any duration of time for which the general price index number is available.

This procedure should be generally applicable where any complex plant or system of works and the like is to be valued by the reproduction method. The general commodity index number is fairly representative of relative average wholesale prices and these reflect the cost of labor. As all such valuations are at best only dependable approximations, the error committed by such a procedure will rarely be material except in the cases where, due to special causes, particular materials used in construction are subject to price variations widely at variance with those shown by the general commodity index number. Until there has been a general adoption of a commodity unit to serve as a standard of value, supplementing the dollar whenever the time element enters into consideration, recourse might well be had to separate index numbers for various classes of materials, for labor and for real estate.

Periodical Modifications of Rate Schedule

Or, looking at the matter from an entirely different angle, may not the value of money be taken into account and be used as the factor to determine periodical changes in the rate schedule? To him who receives the net return resulting from the operation of a public utility, or of any other business, the money he gets has value only to the extent that it is exchangeable for the things which the family needs, food, clothing, shelter, fuel, education, recreation and the like. The best measure at present available of this actual value of money compared with its value at some selected time period, is found in the index number of economists. Why not, then, after rates have once been fixed, make them subject to automatic change, going up or going down at

The small boy welcomes the scarcity of teachers—let everyone be there to welcome the visitors from the East at convention ——

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intervals of about a year according as the value of money, determined by the general commodity index number of the U. S. Department of Labor has gone down or up since the last preceding adjustment? It would be an easy matter to make the index numbers for the last quarter of each year the guide in thus bringing public utility rates into harmony with the purchasing power of money, though it might be necessary, during a transition period in which recourse to the commodity unit as a standard of value is not universal, to use a modified factor such that only that part of the gross income which is in excess of operating expenses will fluctuate with the index number. The necessity of frequent re-valuation for rate fixing purposes would, under such a procedure, be avoided.

Office Records—Their Filing and Indexing

BY IRENE WARREN

(A geographic or territorial plan of filing has been introduced into certain lines of business where it has met with unusual success. The president of the Chicago School of Indexing and Filing sets forth here the various methods of employing this plan, explaining in detail how correspondence and all other data can be filed under the main state divisions with city and firm subdivisions.—The Editor.)

In some lines of business, it seems better to arrange the correspondence, orders, credit information, and various other data, according to a territorial or geographic plan. This is an alphabetic arrangement, but three groups of alphabeting must be kept in mind—the two geographic divisions and the firm or individual names. One of the following geographic plans is most frequently used.

1. (a) Alphabetic by states, (b) alphabetic by towns, (c) alphabetic by firm.
   Illinois, Chicago, Carson, Pirie, Scott & Co.
   Illinois, Waukegan Ingalls, C. B. & Co.
   Illinois, Waukegan, Smith, R. H.
2. (a) Alphabetic by town, (b) alphabetic by state, (c) alphabetic by firm.
   Springfield, Ill., Springfield Republican.
   Springfield, O., Corton Manufacturing Co.
   Springfield, Mass., Jones Car Co.
   Springfield, Mo., Atlas Publishing Co.
3. (a)Alphabetic by groups of states, (b) alphabetic by city, (c) alphabetic by state, (d) alphabetic by firm.
   New England, Boston, Mass., Houghton, Mifflin & Co.
   New England, Portland, Me., Smith Jewelry Co.
4. (a) Salesmen's routes (named or numbered, not always following a state division), (b) alphabetic by city, (c) alphabetic by state, (d) alphabetic by firm.

The description that follows will be of the first scheme: state, town, and firm. If this is understood thoroughly, it will be easy enough to plan any of the other systems.

The state guides are centered with colored tabs so that the state divisions may be seen readily when more than one state is filed in a drawer. Back of each state guide, the cities are arranged alphabetically. Tabs in the first two positions to the left are used, the city name is printed in large clear black type, and in some cases it is advisable to have the population of the city printed on the guide also.

The regular correspondents' folders follow with the tab at the extreme right bearing the name of state, town and firm. Color schemes may be worked out with the labels in the same style as described in the alphabetic arrangements. The position at the left of the regular correspondents' folder is free for any special guides that are needed from time to time. Sometimes this will be a metal-tip guide with the name of the customer whose correspondence is used constantly, so that the clerk's eye may fall on the exact place where this correspondence is located, the minute that the drawer is opened. Sometimes it is a set of **alphabetic** guides for the 26 letters of the alphabet, or the 12 months guides. Every labor-saving device of this sort is placed in the file, and every device that will make for speed and accuracy.

Miscellaneous Correspondents

As miscellaneous correspondents develop for a given town, they are alphabetically arranged in a colored folder which has a tab bearing the name of the state and town. These are inserted as they are needed and are always filed back of the regular correspondent's folders for a given town.

Every firm that sells filing systems has a geographic system. They differ slightly in the position of tabs and a few minor points. A customer may order whatever is needed in geographic guides, as for instance, all cities with a population over 5000 in Illinois, Indiana, Ohio, Michigan, and Wisconsin, or he may order all towns in Illinois only.

The letter should be clearly marked for filing when it is first read. The state and town are so obvious that it is unnecessary to underscore these names, but the individual's or firm's name should be underscored.

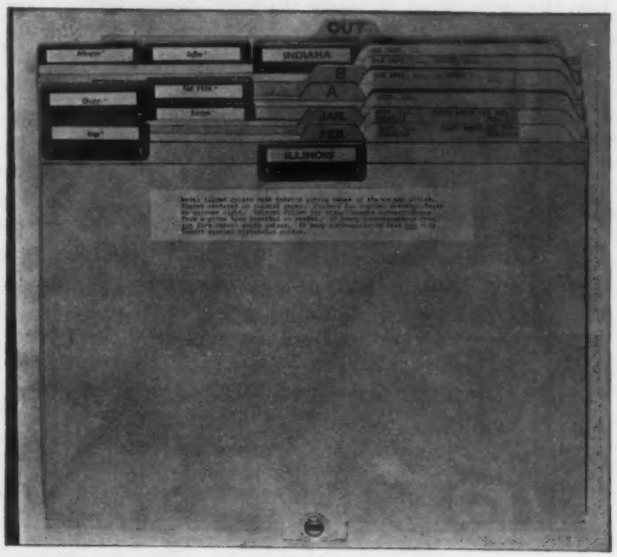
Cross References

The cross references for this system are somewhat more difficult to handle. As before stated, we must be able to make cross references under name, subject or geographic location. The latter will readily find its alphabetic place in the folders of either the regular or the miscellaneous correspondents. But our states are not guided by alphabetic guides and some letters, such as B, are not even represented. To meet this difficulty, some firms have introduced at the extreme left a distinctive large, colored guide for the 26 or more divisions of the alphabet, according to the size of the file. For the subject and name cross references, a stiff, colored cardboard, the size of the folders, with a tab marked "Z reference" and space for words to follow, is ruled to meet this need. In the small file, one of these is inserted for each letter of the alphabet; in the large file as many as are needed are used, sometimes one for each cross reference made, so that they may be placed exactly where they belong in the alphabetic scheme and thus no chance of a mistake is made.

If subject and names develop sufficient correspondence to have a folder of their own, this alphabetic guilding makes it possible to insert such folders exactly where they belong in the one straight alphabetic scheme:

Alabama
Alaska
Applications — Bookkeepers
Applications — Stenographers
Arkansas

In firms using a geographic plan, there is usually a card index record, perhaps a mailing list,



In the geographic file, states determine the main divisions, while cities, then firms or individuals, determine the respective subdivisions.

alphabetically arranged by firm names, which helps to locate the occasional name that is needed when the location is unknown.

In setting up any system, all papers must go in one of two folders — the regular correspondent's folder, or the miscellaneous correspondent's folder. If information will not by its very nature go into one of these two folders, or be treated as they are treated, then it is always necessary to resort to the correspondence-sized card ruled for the purpose, or the tab part of a regular correspondent's folder bearing a large gilt star may be inserted in its regular alphabetic sequence.

Many firms that divided their correspondence or cards by states because they thought they could handle small divisions more easily than large ones, are arranging the towns from the various states in one straight alphabetic arrangement now that they can get such good sets of alphabetic division guides.

Maps frequently supplement geographic files to splendid advantage and make information available at a glance. Wall maps or sectional maps filed flat in shallow drawers are used, on which are placed colored pins to indicate work done in a given city. Salesmen's routes are followed by pinning on colored yarns in the same fashion as lines of progress were marked during the war.

Street Filing

It seems best to add a word here regarding street filing, although it is confined to card indexes. Public utilities—gas, electric light, and telephone companies—must keep such indexes. The names of the streets are arranged alphabetically, in one or two positions at the left, the numbers of the buildings are arranged consecutively under each street; if offices, apartments or some other division is to be made, this forms a third subdivision. In guiding a file of this sort, the aphabetic guides for streets are kept at the left. The street numbers are guided by five positions of guides bearing hundred subdivision (100, 200, etc.), staggered in five or ten positions in the center, and the room numbers are on another colored set of guides at the right. The three divisions are thus so clearly marked that accuracy is assured.

DEALERS' HELPS

(The dealer knows what arguments for and against his goods will appeal to his customers, therefore dealers' helps should be planned in connection with the dealer himself. Both the manufacturer and the dealer will profit through cooperation in this work. —The Editor.)

Retail merchants of the progressive type are willing to pay a part of the cost of producing "dealer help" literature, and other helpful supplemental advertising matter prepared by the manufacturer to help the retailer sell his product. An Eastern sales and advertising manager in addressing the Direct Mail branch of the Associated Advertising Clubs says: "Remember that the progressive dealer is not one who accepts anything and everything that is given to him, but the one who makes the best use of the assistance and service offered to him. Surround your advertising and selling helps with what I would term 'atmosphere,' which will place them above the common level, and make them somewhat difficult to secure. I have no doubt but that it will require tact and judgment to bring every dealer to a common point of view, but if these suggestions are carefully considered in planning the dealer helps of the future, I am convinced in my own mind that the average dealer will be glad to respond to our requests to assume a part of the burden of the cost."

It was brought out further that the average dealer is alive to the necessity of using intelligently the selling helps offered by most manufacturers, but the trouble has been that too many selling helps have been prepared and distributed without first acquiring a reliable knowledge of the actual needs of the dealer. If it does one thing, the present increased cost of materials used in the manufacture of selling helps for dealers will not be an evil unmixed with good. If manufacturers generally can see the necessity of supplying **fewer** and **better** helps to their trade and succeed in making the dealer see the value in their intelligent use, the present conditions will have aided materially in increasing the efficiency of an important part of the entire selling plan.

When the schoolmaster sits on a tack, he arises—so much of importance will arise at the Pasadena conventions that you will want to be there ——

—————— PASADENA — MAY 17-21, 1920

SPARKS—Current Facts, Figures and Fancy

(Facts that you should know on Oriental trade, as well as bits of information on the San Francisco harbor, the latest known use of Epsom salts, the utilization of corn cobs and the introduction of paper clothing appear on this page.—The Editor.)

While the present waterfront line of San Francisco in active use is approximately five miles in length, it comprises 15,000 feet of completed sea wall, about forty piers with about fifteen miles of berthing space and about five million square feet of pier area.

* * *

Holes bored by crawfish in the earthen wing-dam diverting the waters of the Deschutes river through the Bend, Oregon, power plant, are considered responsible for a washout which occurred a short time ago. The repairs will cost the company several thousand dollars.

* * *

Corn cobs, one of the largest waste by-products of farming, may now be utilized as the result of processes which have been worked out and patented for the preparation from corn cobs of adhesive gum and of the rare sugar xylose into substances which may be useful commercially.

* * *

In Mexico during the past year 15 new telegraph offices have been opened for public use. The number of messages sent and received total 12,102,286. There have been 1,879 km. of new lines constructed. The extent of the telegraph system of the Republic at the present time is 87,117 km.

* * *

A plan is reported in the Japanese Weekly Chronicla for chartering a steamer of 10,000 tons, remodeling it into a suitable show place for Japanese products, and sending it around the world. At each foreign port at which the ship stops, representative citizens will be invited on board and made more familiar with Japanese merchandise.

* * *

It is reported that two British inventors have succeeded in producing a device whereby it is possible to dictate a message into a telephone receiver at one end of a wire, and at the other end an automatic recorder inscribes the message on a gramaphone record for later reproduction. The blurring or metallic tone effect is said to be practically eliminated.

* * *

A road of Epsom salts is an attraction Texas can soon hold out to tourists. Ten miles of road are being surfaced with a material which analyzes more than one-fourth Epsom salts. The material is obtained from flats where constant evaporation of gulf water has left silt strongly impregnated with salts, among which the Epsom variety predominates. The mixture forms an excellent road surfacing material.

The London Times states that the Chinese Government, with a view to developing commercial aviation, has entered into a contract with Vickers (Ltd.) for the supply of a large number of Vickers-Vimy commercial airplanes. To meet the cost of the purchase of machines, construction of airdromes, repair depots, and administration, the Chinese Government is making an issue of £1,800,000 (approximately $9,000,000) in treasury notes, all of which sum is to be expended in the development of commercial aviation.

* * *

The first shipment of cotton to a foreign port direct from the harbor of Los Angeles was made when the "Crown of Galicia" took on 800 bales of the Imperial Valley product for delivery to Liverpool. The overseas consignment of the Southern California product was made possible by the high density compress recently installed at Los Angeles harbor. It is municipally owned and of the most modern construction. California's cotton crop was worth $20,000,000 this year.

* * *

Being caught in a rainstorm is not in itself a particularly alarming thing, but if you are wearing a paper suit the state of the weather is rather important. For lack of proper supplies paper clothing is in general use in Bosnia and Croatia—a fact which accounts for a recent story of an Austrian prince whose paper suit began to disintegrate in a heavy shower. He borrowed a suit from a British soldier while his own was drying, but unfortunately the paper garment blew against the stove and was cremated instead of dissolved.

* * *

A comparison of performance of the motive power of the "New Mexico" with that of other battleships shows marked economy in favor of the electric drive. At 12 knots' speed, the consumption in tons of oil per day was 75 tons for the "New Mexico" as compared with 100 tons for the cruising turbines and 118 tons for the main turbines of the "Arizona, and with 99 tons for the cruising turbines and 115 tons for the main turbines of the "Mississippi." At 19 knots, the consumption of the "New Mexico" was 263 tons, of the "Mississippi" main turbines, 305 tons, and of the "Idaho" main turbines, 310 tons per day.

* * *

Estimated production of 370,000,000 barrels of oil in 1919 in the United States, or two-thirds of the total output, emphasizes the relation of the oil industry of this country to world industries. The United States has produced 57 per cent of the world's total output of 7,000,000,000 barrels since 1859.

PERSONALS

Eugene A. Roberts has been elected president of the New Mexico Electric Association, which is to be expanded and enlarged to include the states of Colorado and Wyoming. These states form a logical grouping and their problems are mutual. Mr. Roberts has been active in association affairs and his enthusiasm and energy made him the natural and inevitable choice fos president. He has been connected with The Public Utilities Company of Carlsbad, New Mexico, since graduating from the New Mexico Military Institute in 1912, and is now the manager of that property. The Association looks forward to an active year of work under his able guidance.

C. H. Bromley, associate editor of "Power," has returned to New York after his western trip.

A. G. Balch of Los Angeles was a recent visitor in San Francisco. Mr. Balch is the president of the San Joaquin Light and Power Corporation.

Herbert J. Flagg, chief engineer of The Public Service Commission of Washington, recently visited San Francisco in connection with commission matters.

J. F. B. Regensburg, chief of the dredging department of the Netherland East India Government, with headquarters at Weltevreden, Java, is a recent San Francisco visitor.

George E. Quinan, chief electrical engineer for the Puget Sound Traction Light & Power Co., of Seattle, is again at his desk after an illness covering several weeks' duration.

L. G. Hinwood, electrical engineer for the Australian General Electric Company, is a recent visitor at San Francisco. He left on the S. S. Ventura February 17, 1920, for Sydney.

J. Muirhead has been appointed Inspector of Electrical Energy for the Province of British Columbia, to succeed D. P. Roberts, who has resigned. Mr. Muirhead has been assistant inspector for five years.

Harold G. Cloud, with the Holabird Electrical Company of San Francisco, has resigned to accept a position as sales engineer with the Island Investment Company, Ltd., of Maui, T. H. Mr. Cloud leaves for the Hawaiian Islands during April.

Albert C. Crehore, the noted physicist who is contributing the interesting articles now appearing serially in the columns of the Journal of Electricity, entitled The New Physics, has just been engaged on important research work at Nela Park, Cleveland, Ohio.

H. P. Gibbs and wife of India have been stopping in San Francisco on their way to the eastern part of the United States. Mr. Gibbs is chief engineer and general manager of the Tata Hydroelectric and Andhra Valley Power companies. Since 1913 he has been a Fellow in the A. I. E. E.

W. G. Watson, managing director of W. G. Watson & Company, Ltd., electrical engineers and merchants of Sydney, Australia, will arrive at San Francisco shortly on his way to England on business in connection with his company. Any manufacturers or others desirous of getting in touch with Mr. Watson can address letters to him in care of the Journal of Electricity. Mr. Watson expects to be a few weeks in America working his way across to New York.

F. W. Peek, Jr., consulting engineer for the General Electric Company, and a well known authority on high tension phenomena, is spending his vacation in California, his former home. Mr. Peek spent several days in San Francisco conferring with the staff of the General Electric Company there.

J. S. Andrews, general sales manager for the Domestic Electric Company of St. Louis, Missouri, is a Salt Lake City visitor. Prior to Mr. Andrews' connection with the above company he was for a number of years prominent in the electrical merchandising department of the Commonwealth Edison Company of Chicago.

Jas. H. Bonner, chief engineer of the Montana Railroad Commission, has returned to Helena after a hurried visit to the recently discovered oil fields in eastern Montana. Mr. Bonner is preparing an interesting article for the Journal of Electricity on the power situation in Montana, which will appear in the issue of May 15, 1920.

O. B. Coldwell, second vice-president of the Portland Railway Light & Power Company, has returned north after his recent delightful visit to various California cities, and has just visited Seattle in the interest of arousing even more enthusiasm in attendance from the Northwest at the Pasadena Convention of N. E. L. A., May 18-21, 1920.

R. M. Alvord, San Francisco manager of the supply department of the General Electric Company, has returned from an Eastern visit of several weeks, where he went in the interest of spreading the message of more extensive use of the convenience outlet in the building of houses, agreeable to Garnett Young's paper on this subject which appeared in the Journal of Electricity February 15, 1920.

Frank B. Rae, electrical and mechanical engineer of Cleveland, Ohio, is a recent visitor in the West. Mr. Rae was connected in 1881 with the first electric utility of the United States, the California Light Company, which had a steam plant in San Francisco, and he has ever since been in the electrical business. He was also one of the charter members of the American Institute of Electrical Engineers.

R. H. Ballard, vice-president of the Southern California Edison Company and president of the National Electric Light Association, has returned to Los Angeles from an unusually successful trip to the East in arousing enthusiasm for the forthcoming convention of the association to be held at Pasadena May 28th to 21st, 1920. In New York and on down the Atlantic Coast and Gulf Coast states, Mr. Ballard held a number of helpful meetings. Through Texas and New Mexico these meetings continued to meet with enthusiasm.

E. H. Le Tourneau, electrical engineer with the Portland Railway Light and Power Company, has resigned to accept a position in New York with the Bureau of Construction and Repair, Division of Operation, of the U. S. Shipping Board. Mr. Le Tourneau had been with the Portland Railway Light and Power Company since 1910 in various capacities, including those of superintendent of the Oregon City hydroelectric plant, assistant engineer, office manager of the commercial department, and efficiency engineer. Previous to this time he was employed by the New York Central & Hudson River Railroad Company on electrification work.

Pharaoh's daughter found a little prophet in the bulrushes— you will find much of profit in the spring conventions——

——————— PASADENA — MAY 17-21, 1920

A. H. Halloran, formerly assistant business manager for the Journal of Electricity, has been made Pacific Coast Representative of the McGraw-Hill Book Company of New York City. In the future Mr. Halloran's duties will be two-fold, in that he will have to do with the production end of books in the territory west of the Rockies, and also with the editing of books and the visiting of Western universities and colleges interested in the publication and use of books. Mr. Halloran has a wide experience in the publishing business and a broad acquaintance among engineering and scientific men throughout the West. The McGraw-Hill Book Company was established in 1909 as a combination of the McGraw Book Company and the Hill Book Company. During the past ten-year period its business has grown to such vast proportions that the need of a Pacific Coast representative is considered evident. The best of good wishes are heard on every side for Mr. Halloran in this new work which will be of real service to the West.

C. H. Crawford, manager for the Baldwin Locomotive Works of Rio Janeiro, will become the South American representative of the American Association of Engineers on May 11th.

R. E. Collom, petroleum technologist of the U. S. Bureau of Mines, has changed his headquarters from San Francisco to Dallas, Texas, where he will be in charge of the Bureau's office at that point.

Harris J. Ryan, professor of electrical engineering at Stanford University, will give an unusually interesting paper before the San Francisco Section, A. I. E. E., the latter part of March, on super-sonic research investigations which have vastly forwarded submarine transmission of intelligence.

A. V. Guillou, of the engineering department, Southern California Edison Company, has been appointed assistant engineer, gas and electrical division, of the Railroad Commission. Mr. Guillou graduated from the University of California with the class of 1912 and spent the two following years with the Westinghouse Company in Pittsburgh. Following this he joined the organization of the Pacific Light and Power Corporation. When the latter purchased Mt. Whitney Power and Electric Company, Mr. Guillou became district agent at Porterville. Later he was transferred to the engineering department of the Edison Company.

R. D. Compton has been chosen secretary-treasurer of the San Francisco Electrical Development League, by unanimous vote of the directors. One of his first activities will be the preparation of a photographic roster of the League membership, which is expected to reach 300 by March 1st. Mr. Compton is with the Valuation Department, Pacific Gas & Electric Company, San Francisco.

Renzo Norsa, an electrical engineer from Milan, Italy, who visited various engineering centers of the Pacific Coast during 1919, has returned to his native country to become general manager of the Societe Elettrica Interregronale, with headquarters in Milan.

E. M. Cutting, formerly Pacific Coast representative of the Edison Storage Battery Company, is now with the H. H. Franklin Manufacturing Company of Syracuse, N. Y., manufacturers of the Franklin Motor Car. Mr. Cutting is looking for a number of able and experienced men, preferably along the lines of mechanical engineering and such other kindred lines as they may have taken up or in which they have had considerable experience since leaving college. The many friends of Mr. Cutting in the West send him congratulations over his new position and wish for him every success.

E. M. Herr, president Westinghouse Electric & Manufacturing Company, with headquarters at East Pittsburgh, is a recent San Francisco visitor. Mr. Herr has been long prominent in the engineering world. Previous to his connection with the Westinghouse Company he was superintendent of motive power for the Northern Pacific Railway. In 1898 he became general manager of the Westinghouse Air Brake Company and in 1911 became president. Since that time he has become president of the Westinghouse Electric & Manufacturing Company as well as vice-president of several other electric companies and director of the East Pittsburgh Savings and Trust Company. Mr. Herr is a member of the A. S. M. E., A. I. E. E., and of the American Civic Federation. He is now on his way to Japan where he will investigate trade conditions.

N. E. L. A. APPOINTMENTS

The reorganization plans at National Electric Light Association headquarters, which are intended to increase and better the service rendered to member companies, have been furthered by the addition of Fred W. Herbert, as superintendent of the service department, and George F. Oxley, as director of the publicity department. Both of these men are of the West, where Mr. Herbert was chief statistician for the Colorado Public Utilities Commission, and Mr. Oxley manager of the Mountain Division of the American Red Cross.

Mr. Herbert is a trained accountant, a practical rate man, and has been closely associated with state regulation, accounting, and statistical work. Prior to his appointment as chief statistician of the Colorado Public Utilities Commission, five years ago, he was connected with Western utilities for many years as secretary and auditor. Among other matters he will assist in promulgating and interpreting the uniform classification of accounts established by the National Electric Light Association for all electric utilities, and have charge of rate research and general statistical service for member companies of the Association.

Mr. Oxley's work, as director of publicity, will supplement that of the National Committee on Public Information and the Advertising and Publicity Service Bureau, and will comprise supervision of the National Association Magazine, the promulgation of a plan of national publicity in the interests of the electrical industry, and the organization of public information work throughout the country. Mr. Oxley received his newspaper training on Worcester and Boston newspapers, and in later years has been special writer on newspapers in the West.

OBITUARY

W. R. Baker, president of M. C. Baker & Son, an electrical supply house, died recently at his home in San Francisco.

A. S. Armstrong, for over twenty-five years private secretary for R. J. Davis, passed away on March 7, 1920, after a lingering illness. Mr. Armstrong, known to all the trade as "Billy," became identified with the electrical fraternity as a clerk in the office of the Edison Light & Power Company, San Francisco, in 1892.

Meeting Notices for Electrical Men

(At the Del Monte meeting of Western Electrical Supply Jobbers, the usual enthusiasm was shown both over business and golfing activities. A noteworthy meeting of Honolulu electrical men is reported as well as interesting meetings in the Northwest states and in southern California.—The Editor.)

Pacific Division, National Electrical Supply Jobbers Association

The quarterly meeting of the Pacific Division of the National Electrical Supply Jobbers Assosiation was held at Del Monte, California, Feb. 26, 27 and 28, 1920.

The open meeting of the association, held at the Del Monte Hotel during the afternoon of Feb. 28, proved unusually interesting. C. B. Hall, general manager of the Illinois Electric Company, with headquarters at Los Angeles, presented a paper on the present business outlook. The paper of Mr. Hall sketched the financial situation as it appears to the jobber today and offered certain prognostications for the future. In a discussion which followed it was developed that sane business endeavor, taking each day as best one can, is after all the only sure way of preparing for the future, which no one at present can definitely foretell. The paper brought forth unusually lively discussion in which the point was brought out that the jobbing industry, as well as other branches of the electrical industry, should do everything possible to assist central station financing in the West at the present time and encourage employes of the various jobbing houses and other employes in the industry to show confidence in the outlook by investing in these securities, which are beyond the question of a doubt of of very high standing.

In the golf tournament W. M. Deming, Pacific Coast general manager of the McGraw-Hill Company, won the Turner trophy, while R. A. Balzari, of the Westinghouse Electric & Manufacturing Company, won the Manufacturer's cup. Mr. Balzari keeps the trophy permanently, as this is the third occasion on which he has won it. To R. D. Holabird, of the Holabird Electrical Company, went the famous Jobbers' cup. O. B. Stubbs of Portland acted as toastmaster at the evening banquet, and in his usual quiet and forceful manner brought out many interesting and amusing incidents connected with the jobbing industry as well as that connected with the playing of golf.

Those present at the meeting were as follows:

G. H. Curtis, sales manager, Electric Railway & Mfrs. Supply; W. M. Deming, Pacific Coast general manager, McGraw-Hill Company; A. H. Elliott, secretary Electric Supply Jobbers' Association; N. W. Graham, Graham-Reynolds Electric Co., Los Angeles; C. G. Gauntlett, Pacific Coast representative, Safety Insul. Wire & Cable Co.; W. H. Green, representative, Chicago Fuse Mfg. Co.; S. B. Gregory, Pacific Coast representative, Arrow Electric Co.; C. C. Hillis, vice-president and general manager, Electric Appliance Co.; D. E. Harris, vice-president Pacific States Electric Co.; R. D. Holabird, Holabird Electric Sign Co.; C. B. Hall, secretary and manager, Illinois Electric Co.; E. E. Arnold, manufacturer's representative; J. H. Jamison, Westinghouse Electric & Mfg. Co.; C. E. Listenwalter, Listenwalter & Gough; F. H. Murray, National Carbon Co.; R. F. Oakes, National Carbon Co.; R. S. Prussia, Westinghouse Lamp Co.; Albert Rives, representative of North Coast Electric Co.; O. B. Stubbs, Stubbs Electric Co., Portland; H. E. Sanderson, Pacific Coast representative, Bryant Electric Co.; H. B. Squires, H. B. Squires Co.; Robt. Sibley, editor Journal of Electricity; Miles Steel, Pacific Coast representative, Benjamin Electric Co.; J. A. Vandergrift, Pacific Coast manager, National Lamp Works; W. C. Wurfel, Westinghouse Lamp Co.; Roy Worth, representative of Pacific Coast Electric Co., of Seattle; C. E. Wiggin, manager electric department, Dunham, Carrigan & Hayden; Garnett Young, Garnett Young Co.; E. A. Hunt, Pacific Coast manager Robbins & Myers Co.; W. S. Dunbar, Westinghouse Electric & Mfg. Co.; R. A. Balzari, Westinghouse Electric & Mfg. Co.; H. W. Turner, president Montana Electric Co.; W. B. Sawyer, Jr., U. S. Steel Products Co.

California Electrical Cooperative Campaign

At a meeting of the Salesman's Auxiliary of the California Electrical Cooperative Campaign, H. W. Angus, secretary of the organization, showed the effects of the intensive advertising campaign that had been launched in the last six weeks of 1919. A gain of 5,119 advertisements amounting to 81,161 column inches in 1919 over the same period of 1918 had brought in a gain of 68,152 sales, or 62%, in figures compiled from reports sent in by sixteen jobbers. The largest increase in sales of one appliance was in the electric washing machine, which had increased over 400%. Figuring an average cost of seventy cents an inch for advertising space, the total cost of advertising to reach this great gain was $79,454, and the publicity given to the campaign amounted to 49 pages.

The duties assigned at present for 1920 by the Advisory Committee are:

1—To introduce the standard and simplified accounting systems.

2—To emphasize the importance of subscribing to and reading electrical trade journals, especially the Journal of Electricity, Electrical Merchandising and the Electrical Contractor-Dealer.

3—To point out the necessity that all buildings wired have sufficient and proper outlets for the use of electric appliances.

4—To secure the closest cooperation of the jobbers and manufacturers with the two other branches of the industry—the power companies and contractor-dealers.

5—To assist the field men in securing membership from non-members in the California State Association of Electrical Contractors and Dealers, and encouraging all contractors and dealers to take an active part in their sections and locals and other association work.

Figures on the building now under way in California showed that if, in the 130,000 homes required, twenty outlets were installed instead of the one which used to be put in, it would mean a possible outlet business to the contractors of $12,350,000. The average value of appliances in the home is $150 out of a possible $750, which would mean that if every new home in California were made a truly electrical home it would bring about a sale of $97,500,000 worth of appliances.

BUILDERS OF THE WEST — LXXIII

S. L. SHUFFLETON

That the erection and completion of vast hydroelectric installations and transmission lines continue to mark progress in the West is an indication of the healthful growth of a region foremost in development along lines of engineering achievement. To S. L. Shuffleton, at present in charge of construction on the Caribou Plant of the Great Western Power Company, and whose part in the conception of design and in the successful carrying out of the installation did much to make possible the highest voltage long distance transmission line in the world, this issue of the Journal of Electricity is affectionately dedicated in lasting acknowledgment of his substantial contribution to Western progress.

The presidential candidates promise to attend to the high cost of living—promise yourself now that you will attend convention ——

—————— PASADENA — MAY 17-21, 1920

Mr. Angus further pointed out the need of convenient outlets, for in homes where they were not provided 60% of the appliances stayed on the shelves, but where outlets were provided 97% of the appliances were in everyday use.

The fact was brought out that the salesmen of the various manufacturers and jobbers were not doing anything toward helping the Cooperative Campaign, and so to educate them and teach the idea of the campaign a meeting will be held on April 2, at which all of the outside salesmen of the manufacturers and jobbers will be present. The result of such a meeting will be that the dealer in the small towns will be brought to see the great benefits to him of the campaign and to make him join in the cooperative spirit because he believes in it as necessary to the greatest good of the electrical industry and to the people of the State of California.

Ladies' Day at Development League

As might be expected, Ladies' Day proved to be a most successful meeting of the San Francisco Electrical Development League. The High Cost of Living was the topic of the day and was particularly well chosen since it is one as vital to the ladies of electrical men as it is to the men themselves.

Mrs. Annette A. Adams, the speaker, was introduced by Clotilde E. Grunsky, associate editor of the Journal of Electricity. Miss Grunsky delighted members and guests with a humorous philosophy on the subject in hand which put all in an excellent frame of mind for H. C. L. discussion, tragic as it might be.

Mrs. Annette Adams is a United States attorney and her wide experience in dealing with this problem put her in a position to present it in a new light. She emphasized, particularly, the fact that the consumer can do much to relieve the present day situation by personally diminishing the demand made upon manufacturers, wholesalers and dealers.

In addition to these talks, all retiring committee chairmen gave snappy reports of their past year's work.

Oregon Section, A. S. M. E.

The Oregon Section is one of the youngest local sections of the A. S. M. E., having been authorized on October 25, 1919. Its territory embraces all of the state of Oregon and the part of the state of Washington within a radius of thirty miles from the Portland City Hall, thus including the city of Vancouver, which, although in Washington, is really tributary to Portland in an industrial sense.

The officers are:

Chairman: Mr. B. C. Ball, president Willamette Iron and Steel Works.
Secretary: Dr. E. W. Lazell, consulting engineer.

Relations to other societies are covered by the following statement:

"A joint council of the engineering interests of Oregon has been formed whereby each of the local sections of the national societies have two representatives for the first fifty members of their respective organizations, and one representative for each hundred members thereafter. This joint council will act in state and municipal matters concerning engineering activities. There are at present seven or eight organizations entitled to membership in the joint council."

Several of the members of the Section are actively interested in a committee for industrial and scientific research recently formed at the Oregon State College, and it is probable that this committee will be made the clearing house for any problems that may present themselves. The Section delegate is chairman of this committee and on behalf of the Section solicits all possible assistance from the Research and Standardization Committees of the Society.

It is the desire and intention of the Section to take active part in all matters of civic interest. This can probably be done most effectively through the Society's representatives on the Joint Council.

Joint Meeting of Los Angeles Engineers

A joint meeting of the Los Angeles sections of the American Institute of Electrical Engineers and the American Chemical Society was held in the Los Angeles City Club on the second of March. Dr. Robert A. Millikan of the University of Chicago, who is now giving part of his time to the California Institute of Technology in Pasadena, gave an address on the recent developments in physical research.

Doctor Millikan has spent two years as research director of the National Research Council. His talk contained many noteworthy statements. In discussing the absence of corona in high vacua the Doctor stated that transmission lines in the future might consist of conductors in long vacuum tubes and further, in referring to recent telephone achievements he said, "The pure science of today is the applied science of tomorrow."

In speaking of the patience of investigators, Doctor Millikan said, "Science advances by small steps—a bit here and a trifle there—contributions to the field of knowledge which in the aggregate mark real progress. There are few big discoveries. Often what is known to the layman as a big discovery is merely the publication of details coming from a number of contributors and frequently the man who receives credit is no more worthy than some of the others whose bit made his so-called discovery possible."

The lecture was illustrated by lantern slides of spectra taken in the region lying between the violet and the X-ray, a portion of which to this time has not been investigated. Slides were shown of spectra, taken by means of gratings, which overlap the area of the X-ray.

Meeting of Honolulu Dealers

The Honolulu Commercial Club was a scene of gay festivity when the electrical dealers of the city gathered at an informal convention and dinner for the purpose of creating greater interest and cooperation in the sale of electrical goods locally. A novel idea for an extensive sales campaign whereby local housewives will have an opportunity of witnessing practical demonstrations of the latest labor saving devices was graphically portrayed by the appearance of several young women representing the "Poor Man's Wife," "Mrs. Well-To-Do" and the "Servant," who effectively demonstrated the plan for eliminating the servant problem. The climax was reached when the goddess of "Household Liberty," crowned in electric lights, emerged from a washing machine, which until then had appeared as an inanimate piece of mechanism. The dinner was enjoyed by more than 40 representative business men, for whose entertainment a novel musical program was given.

Interesting talks on the subject of cooperative work were made by C. A. Langlais, a prominent contractor of San Francisco; A. S. Hayward, sales manager for Catton, Neill & Co.; J. C. Blair of the Island Electric Company of Maui, and J. R. Cox, Westinghouse representative, who were guests of the occasion.

A. I. E. E. and N. E. L. A., Portland Sections

The regular monthly meeting of the Portland Sections of the N. E. L. A. and the A. I. E. E. was held in the University Club auditorium on March the ninth. Mr. W. H. Crawford, manager of the Department of Industries of the Portland Chamber of Commerce, reviewed the "Industrial Development of the Portland District." This subject so closely related to the future welfare of the public utilities of that city, was of vital interest to these men of the industry.

American Association of Engineers, Astoria

The local chapter of the American Association of Engineers at Astoria elected the following officers at a recent meeting: R. R. Bartlett, president; A. S. Tee, first vice-president; L. C. Rogers, second vice-president; G. T. McClean, secretary; H. N. Hackett, treasurer.

Plans for N. E. L. A. Convention

(Eight weeks from now thousands of electrical men from all over the nation will be on their way to the Pasadena Convention. A score of capable committee chairmen are now busy making arrangements for golfing, auto rides and banquets, as well as for regular convention sessions. A schedule of the four star evenings and a list of the committee chairmen are given below.—The Editor.)

Now that committee chairmen have been appointed by the N. E. L. A. Convention chairman, John B. Miller, definite plans are being made which cover every phase of the convention program. A feature event has been scheduled for each of the four evenings. On Tuesday night a reception will be held in honor of the N. E. L. A. president, R. H. Ballard, at the Hotel Huntington. On Wednesday night the celebrated Mission Play will be given. This play, which re-enacts the olden days in California, is well known as a special California feature and will undoubtedly come up to all expectations in being a truly interesting and instructive production.

Thursday night has been given over to the Public Policy Committee which is planning to hold an open meeting of interest to all delegates. On the last night of the Convention, the big banquet will be held at the Maryland Hotel under the auspices of the Pacific Coast Section of the N. E. L. A. This will certainly be a great success since it is being arranged by Emory Wishon, president of the Pacific Coast Section. The famous Mack Sennett bathing girls are scheduled as part of the evening's entertainment. Arrangements are being made to accommodate two thousand guests.

The convention of the Pacific Coast Section of the N. E. L. A., which is to be held in the two days just preceding the National Convention, will take place, mainly, at the Green Hotel, Pasadena. Headquarters will be maintained both at the Hotel Maryland and at the Huntington Hotel of that city.

An effort is being made to have all of the California delegates drive to the convention in their automobiles so that there will be a sufficient number available for transporting convention guests to nearby points of interest.

The committee chairmen have been announced as follows:

A. E. Morphy, Vice Chairman
George W. Elliott, Master of Transportation
S. M. Kennedy, Program
W. H. Aylesworth, Registration
A. B. Wollaber, Hotel Committee
A. N. Kemp, Finance
W. L. Frost, General Chairman Entertainment
C. S. Walton, President's Reception
A. E. Wishon, Pacific Coast Section Meeting
K. E. Van Kuran, Ladies' Committee
J. W. Burns, Golf Committee
R. J. Cash, Dancing
C. H. Coulter, Motion Pictures
E. R. Davis, Power Plant Inspection
B. F. Pearson, Catalina and Coronado Trips
P. H. Ducker, Local Transportation
C. M. Masson, Illumination
C. H. Pierson, Publicity
F. B. Lewis, Auto Rides
C. S. Vance, Whips
H. N. Sessions, Farewell Committee

PACIFIC NORTHWEST PLANS

Electrical leaders of the Northwest are determined that a very large delegation from the Pacific Northwest states shall appear at the Pasadena convention. A special effort is being made to secure the attendance of as many electrical contractors and dealers as possible. Patrons of the cooperative plan believe that if a good-sized delegation of contractor-dealers can accompany the central station and manufacturer representatives to this convention and see how the plan works in California, a big step will be taken in accomplishing desired results in the Pacific Northwest.

Further, the contractors and dealers will get, at Pasadena, first-hand knowledge of the problems facing the central stations which can be secured in no other way.

The fact that electrical contractors and dealers have not heretofore held membership in the N. E. L. A. should in no way detract from the representation of this branch of the industry. If the purpose of this national convention is to be accomplished, all branches of the industry and all sections of the country must be adequately represented.

PACIFIC COAST SECTION N. E. L. A. CONVENTION PROGRAM

Following is the program which has been arranged by the Pacific Coast Section of the National Electric Light Association for the convention at Pasadena, immediately preceding the National Convention:

May 18th

9:00 a.m.	General Session—Opening Meeting President's Address—A. Emory Wishon Secretary's Report—A. H. Halloran Treasurer's Report—J. F. Pollard Report of Committee on Cooperation—T. E. Bibbins Report of Membership Committee—Harry N. Sessions Report of Publicity Committee—I. W. Alexander Appointments of Committees Announcements
10:00 a.m.	Accounting Committee Session—P. R. Ferguson, Chairman
10:00 a.m.	Commercial Committee Session—K. E. Van Kuran, Chairman
10:00 a.m.	Engineering Committee Session—P. M. Downing, Chairman
Noon.	Executive Committee Session
1:30 p.m.	General Session—Papers to be discussed: "Railway Electrification," by J. E. Woodbridge "Commercial Aspects of Railway Electrification," by E. B. Criddle
2:40 p.m.	"Cooperating with Architects and Builders," by Garnett Young "Value of Solicitors," by A. W. Childs "Unelectrified Horsepower," by J. O. Case "Standardization of Wiring Devices and Methods," by H. H. Courtright Report of California Electrical Cooperative Campaign Committee—L. H. Newbert
4:30 p.m.	Closing Business Session Report of Resolutions Committee Unfinished Business Report of Nominating Committee

A snap taken of R. H. Ballard and friends, in Albuquerque, New Mexico. This was during Mr. Ballard's recent recruiting tour for convention delegates. Undoubtedly individuals of this high calibre of intellectuality will prove of great helpfulness at the big convention. The gentleman to the left is Mr. I. F. Greenawalt of the Pacific States Telephone & Telegraph Company, Denver, Colorado. The names of the two ladies have not as yet been secured.

There is plenty of cold water in the spring—do not forget that the big Pasadena conventions are also in the spring ——
—————— PASADENA — MAY 17-21, 1920

Napoleon met his match at Waterloo—you will meet just the men you want to see at the Pasadena conventions ——
—————— PASADENA — MAY 17-21, 1920

HAPPENINGS IN THE INDUSTRY

POWER SHORTAGE AGREEMENT

Seventeen of the leading power companies of California have agreed to stand together in the present power shortage emergency. They have requested the State Railroad Commission to assume complete control in determining rules of service for the distribution of electrical energy. The signing of the following agreement was typical of the spirit of co-operation which is being maintained at this time:

"We, the undersigned, hereby pledge that we will obey and carry into effect to the limit of our ability all rules, regulations and orders of the Railroad Commission concerning diminution of service or taking on of new business and interchange or delivery of power between the several companies." Signed by:

California Oregon Power Company, Pacific Gas & Electric Company, Great Western Power Company of California, Western States Gas & Electric Company, Vallejo Electric Light & Power Company, Snow Mountain Water & Power Company, Coast Counties Gas & Electric Company, Coast Valleys Gas & Electric Company, San Joaquin Light & Pawer Corporation, Midland Counties Public Service Corporation, Southern California Edison Company, Santa Barbara Electric Company, Mt. Whitney Power & Electric Company, Southern Sierras Power Company, City of Los Angeles, Los Angeles Gas & Electric Corporation, Holton Power Company.

DEMAND FOR PROFESSIONAL ENGINEERS

The American Association of Engineers reports a great demand for professional engineers in all industrial centers. The supply of engineers has been reduced materially by the number going into more lucrative lines of business. Salaries for engineers are beginning to increase. Detailers on structural design work receive from two hundred to two hundred and fifty dollars per month, while transitmen are securing one hundred and seventy-five dollars per month.

ELECTRICITY IN WALNUT GROWERS' FACTORY

The California Walnut Growers' Association have acquired a valuable site at Seventh and Mill Streets, Los Angeles, where they will erect a seven-story warehouse and factory for the handling of their annual crop of 12,000 cars of nuts. The walnut men are generous users of electricity and this new factory will have several unique applications, including the use of electric mangles to kill coddling moths which breed in the empty sacks. Another application will be the new machine for branding walnuts. This machine was designed in response to an advertisement offering $10,000 in prize money to anyone who could develop an automatic device for this delicate work.

DISTRICT OFFICE AT DELANO

On account of the rapid development in the southern portion of Tulare county as well as the northern part of Kern county, the Mt. Whitney Power and Electric Company has found it necessary to establish a new district office at Delano. The new territory will embrace the towns of Pixley, Sarlimar, Richgrove and McFarland, and the city of Delano.

This district is now an important part of the Edison system as the new Vestal substation, located at Richgrove, will be the point of connection between the Big Creek lines, the new Kern River Number Three plant and the new 60,000-volt loop connecting the Mt. Whitney stations.

The company has a two-story, reinforced concrete building at Delano. This was designed as a substation but when the system was changed to 60,000 volts an outdoor type installation was made, leaving the building available for a commercial office.

Rodney E. Bacon will be district agent and Richard L. Wells will be district foreman in the new territory, which will be completely organized by April first.

RE-ADJUSTMENT OF CHARGES

The Southern California Edison Company has filed an application with the Railroad Commission asking for a complete re-adjustment of its charges for electrical energy in the counties of Los Angeles, San Bernardino, Riverside, Orange, Ventura, Kern, Tulare and Fresno. The company claims that its present charges, including a surcharge allowed by the Commission in December, 1918, do not, because of greatly increased operating expenses, yield a fair return on the company's investment of approximately $84,873,000. As a further reason for an increase in its rate the company says that the scarcity of water will greatly increase the company's outlay for fuel oil for its steam plants. In 1920 the company estimates its outlay for fuel oil, largely because of the shortage of water power, will be $1,750,000 in excess of its oil expenditures for 1919.

DAM ACROSS SNAKE RIVER

A tentative contract between the United States and the canal companies and irrigation districts interested in the storage and utilization of the flood and normal flow of the Snake river in Idaho has been approved by Secretary Lane. Plans now being worked out provide for the construction of numerous storage dams. At American Falls it is proposed to construct a high dam across Snake river, creating one of the largest irrigation reservoirs in the United States. The construction of this dam will necessitate the removal of the town of American Falls to a tract of level table land near by, and the removal of the line of the Oregon Short Line railway to higher ground. Construction of the American Falls reservoir, capacity 3,000,000 acre-feet, may be undertaken almost immediately by the United States Government under a contract with Idaho canal companies and irrigation districts. The Department of the Interior has already signed a tentative contract whereby the federal government will assume the work of construction, while Idaho water users will pay the expense of the undertaking. The proposed Twin Falls-Bruneau reclamation project, a dam 90 feet high, 5,280 feet long at the top and 500 feet long at the bottom is planned.

SOCIETY INCREASES ACTIVITY

During the war, the Society for Electrical Development was obliged to restrict its activities, although it continued throughout to do all its curtailed budget permitted, and carried on sufficiently to justify the subscriptions of those members who supported it. During the past three months so many of the big companies have resumed their membership that the funds available for the society's work are over fifty per cent greater than at the time of the November meeting of the board of directors.

Greater activities will be undertaken as justified by the increased revenue, and it is now desired to line up the entire industry in support of the very important work being carried on and contemplated. This work has for its main feature the education of the public to an appreciation of the uses of electricity for domestic and power purposes.

PERMANENT RATE INCREASE APPLIED FOR

An application has been filed by the San Diego Consolidated Gas and Electric Company with the Railroad Commission, in which the company asks that the temporary surcharge granted them last April be made permanent. The company states that all the signs point towards an increase in operating expenses instead of a decrease and that the

federal income taxes which the Commission refused to allow as operating expenses will be a permanent charge.

The present surcharge was to have continued in effect until May 1, 1920, and if the claim of the company regarding the permanency of the federal income tax is allowed all of the other companies will be able to include it in their operating expenses, which will make a material difference in the earnings of the companies.

RECLAMATION PROJECT

The Oregon State Engineer has approved the general plans for the reclamation of the lands in the Grants Pass Irrigation district, which comprise an area of about 8,000 acres of land lying adjacent to the city of Grants Pass, in Oregon. It is proposed to expend $106,000 in the installation if a temporary pumping plant to deliver water to the cultivated area within the district during 1920, and the construction of laterals and other structures for the delivery of water to the district lands. A considerable part of this construction work will be utilized in connection with the construction of a permanent system under which it is intended to construct a diversion dam in Rogue river and canals which will serve most of the lands within the district. However, the higher lands in the district will be served by direct connected pumps. It is estimated that the complete reclamation of the project will cost in excess of $500,000.

SPECIAL LIBRARY CENSUS

At a time when the government is counting up its inhabitants, the Special Libraries Association is enumerating the special library collections of the country, because there does not exist at present an adequate directory of special libraries.

In the spirit of cooperation, and in order to list the special information sources of the country, the Special Libraries Association—the national body of special librarians—submits the following questions and is asking business men to answer them. When compiled, the directory will not be used as a mailing list for advertisers, but merely for the purpose stated,—to have in a central place, a record of the special information sources of the country.

A special library has been defined as, "A good working collection of information either upon a specific subject or field of activity; it may consist of general or even limited material serving the interests of a special clientele; and preferably in charge of a specialist trained in the use and application of the particular material."

The Special Libraries Association asks for the following information from libraries which come within the above qualifications:

(1) Name of institution or company.
(2) Name by which library is known.
(3) Name of librarian or custodian.
(4) Can it be classified as any of the following: financial; business; legal; engineering or technical; institutional; municipal; reference; agricultural.
(5) If not, how can it be classified?
(6) Does it serve a special clientele?
(7) Would your librarian be willing to assist other special libraries to a reasonable extent?

The above data should be sent to Wm. F. Jacob, Chairman Library Census Committee, care General Electric Company, Schenectady, N. Y., who will be glad to answer any questions relating thereto.

SEATTLE STREET CAR TRAFFIC

Rapid growth of traffic on Seattle's street railway system necessitating additional car service on downtown trunk lines already congested during peak load periods, has brought about a situation which has reached an acute stage, according to Superintendent of Utilities Thomas F. Murphine. Statistics which he has compiled for incorporation in his annual report show that the municipal street railway lines have carried 92,061,302 passengers during the eight months since the city took over the traction properties. In the similar eight months of last year, the lines carried 79,959,132 passengers, 12,102,170 fewer than this year.

In order to take care of the increased amount of traffic, at least 50 additional cars are needed, but these cars could not be successfully operated on First, Second and Third Avenues without increasing traffic congestion, already serious. According to Superintendent Murphine, the situation emphasizes the need of a subway and elevated system in the business district.

EMERGENCY WATER CONSERVATION CONFERENCE

The Emergency Water Conservation Conference, headed by E. O. Edgerton, president of the California Railroad Commission, and formed of state and federal officials whose duties keep them in touch with the water situation, have met in San Francisco to make recommendations that will secure the greatest efficiency from the available water and power and reduce to a minimum the damage resulting from the shortage of water. The first recommendation made by the conference was that all irrigating be done in the night time, as then the greatest good is done by the water and there is no loss on account of evaporation. The night irrigating will also remove the peak from the power companies' load.

The personnel of the Conference is as follows:

E. O. Edgerton, president Railroad Commission; C. T. Harding, for the State Engineer; Frank Adams and F. J. Veihmeyer, U. S. Dept. of Agriculture and U. of C. Irrigation Investigators; G. H. Hecke, State Dept. of Agriculture; C. H. Lee, State Water Commission; H. D. McGlashan, U. S. Geologic Survey; A. H. Palmer, U. S. Dept. of Agriculture; H. G. Butler, State Power Administrator; Lt.-Col. L. H. Rand, U. S. Dept. Interior Waterways; C. H. Loveland and L. S. Ready, Railroad Commission of California.

POWER PLANT TO APPLY POWDERED COAL

The Philadelphia Rapid Transit Company, after careful investigation, has decided to equip its Mount Vernon street power station with a powdered coal system for firing the boilers, using river and buckwheat anthracite coal. This plant is at present producing 75,000 kw-hr.

Considerable economies are to be realized through greater combustion efficiency, saving in labor, and ability to use a much lower grade fuel than that now in use. The powdered coal equipment which is to be installed will be the Quigley system which includes complete apparatus for preparing, distributing and burning the fuel. This system will permit accurate records of fuel consumption for each individual boiler. The change from hand fired to powdered coal will be made without interruption to service.

The San Joaquin Light and Power Corporation have been giving remarkably fine publicity to their stock campaign. The company is offering $3,500,000 in 7% cumulative prior preferred non-assessable stock at $98.50 per share. Above are shown three full-page newspaper advertisements which were instrumental in convincing prospective stockholders to invest in public utility stock.

The wets have almost given up hope for John Barleycorn—there will be little hope for you if you fail to attend convention ——

—— PASADENA — MAY 17-21, 1920

THE WATER POWER LEAGUE OF AMERICA

A Letter to the Editor

(Inquiry having come into the editorial department as to the present status of The Water Power League of America, the following letter from the president of the McGraw-Hill Company, publishers of eleven national engineering magazines, should prove interesting and helpful.—The Editor.)

Sir:

As I understand it, the Water Power League of America was organized to do for Industry generally and for the public at large what N. E. L. A. is doing for the electrical industry. I understand the League is governed in general by the same principles which actuate the N. E. L. A. and is working for the same purpose. If it is a duplication, and if the League cannot extend its activities to educate the public in a conservative way, naturally I would have no use for it and could not continue as a member of the League or as a member of the Advisory Council. Personally, I have not been in close touch with it. Some of the leading members of the Advisory Council are: Gen. Geo. W. Goethals; Dr. Edward G. Acheson, past president of the American Electro-chemical Society and now connected with the Niagara Falls Power Company; John G. Luke, president of the West Virginia Pulp & Paper Company; Emerson McMillin; A. H. Smith, president of the New York Central Lines; Paul Starrett, president of Geo. A. Fuller Company.

The League is entirely new. Whether or not it can justify its existence I do not know. You may, however, rest assured that neither Electrical World nor any of the McGraw-Hill publications nor I will back any program that is not helpful to the electrical industry. If you have any other point of view, or if you get any information bearing on the situation, I shall appreciate it if you will acquaint me with the facts as you see them.

At the beginning, Mr. Chas. H. Ingersoll, of Dollar Watch fame, was a member of the League and was proposed as a member of the Advisory Council. It soon developed, however, that his views were not in accord with the majority. As I understand it, his ideas were more or less in accord with those of Gifford Pinchot and when he discovered that the Council was in favor of the present water power bill before Congress he resigned from the League and as a member of the committee.

Very sincerely yours,

JAS. H. McGRAW.

LIGHTING OF BROADWAY, LOS ANGELES

A Letter to the Editor

I note that in an editorial in the February 15th issue of the Journal of Electricity, you refer to the lighting standards being placed too high in Los Angeles. Most of this criticism originated prior to the time the lights were turned on, just the same as it did in San Francisco, and was largely due to the customary inability of the layman to accommodate himself to radical changes. Furthermore, he knows nothing about characteristics of light distribution. The principal reasons for placing the lights high are:

1st: The high power source is more out of the direct line of vision.
2nd: The general distribution is much better and the effect of high intrinsic brilliancy minimized.
3rd: The reflections of the lamps in the show windows are projected at a lower angle and come less into the line of vision and therefore interfere with the window displays.
4th: Horizontal shadows of street cars and other objects are foreshortened.
5th: The high standards look much more dignified by day as well as by night, and, owing to the height of the mass, the sidewalks look less narrow than with the ordinary low standards with their clusters of globes ten or twelve feet above the sidewalk.
6th: In intensive white way lighting it is desired to carry the light up to the sky-lines of the buildings with good illumination on the cornices, so that for this reason if no other the lamps should be placed 25 to 30 feet above the sidewalk level.

Modern intensive white way lighting should be regarded in a measure as floodlighting with the decorative features of the lighting units themselves maintained. The layman who is accustomed to the ordinary low lighting standards and suddenly is confronted with the high standards would feel the same as he would in putting on a silk hat for the first time after wearing a derby squashed down on his ears. He would sub-consciously know that he looked more dignified but it would take a little while for him to become accustomed to the change, after which he would dislike to go back to the derby.

W. D'A. RYAN,
Director Illuminating Engineering Laboratory.

An Apology

In the February 15th issue of the Journal of Electricity the article on the Broadway Lighting System of Los Angeles was credited to W. D'Arcy Ryan, instead of to A. F. Dickerson. The greater part of the data was supplied by Mr. Ryan, but Mr. Dickerson was the author of the article as published. We tender our apologies to both for the error.

TRADE NOTES

Change in Construction Department —

The electrical construction department of the Pacific Fire Extinguisher Company has been discontinued. The former manager of this department, Mr. H. C. Ried, will continue the electrical construction business under his own name, with temporary headquarters at 440 Howard street.

Prizes for Window Display and Sales Story —

Several months ago the Benjamin Electric Manufacturing Company inaugurated a window trim and sales story contest among its distributors and dealers, the objective being the sale of a million Benjamin Two-Way Plugs, the No. 92 Cluster, during the holiday season.

There were three prizes: first, $100; second, $75; third, $50, for the best window display on the Two-Way Plug, and similar prizes for the best sales story about the Benjamin Two-Way Plug.

In response to an offer to supply gratuitously complete equipment for window trimming and the facilitating of sales, nearly 1,000 direct returns were received. The dealers went into the thing enthusiastically and a mass of photographs of trimmed windows and sales stores was submitted to the judges.

Branch Plant to be Constructed —

The Apex Appliance Company of Chicago is planning the construction of a branch plant at Oakland, California, to have an initial capacity of 20,000 electric washing machines annually. This company also manufactures vacuum cleaners, ironing machines and similar appliances.

Use of Preferred Stock Money —

The Western States Gas and Electric Company, which operates in Stockton, has been authorized to use $56,191.80 obtained from the sale of preferred stock. The money will be applied towards the payment of current indebtedness resulting from the construction of extensions, additions and betterments to the company's plant.

Wire Company Purchased —

The American Chain Company of Bridgeport, Connecticut, has purchased the control of the Page Steel & Wire Company, with mills at Moneason, Pennsylvania, and Odrian, Michigan. It is the intention of the American Chain Company to continue the business of the Page Steel & Wire Company as heretofore, taking only its surplus product. The plants consist of open hearth furnaces, rolling mill, wire mills, as well as fence factories.

Erratum: In the article descriptive of the Fontana plant in the March 1st issue of the Journal of Electricity, the words "deflecting nozzles" should read "jet deflectors."

LATEST IN EVERYTHING ELECTRICAL

(The new regulator presented here combines the qualities of simplicity and strength so desirable in this sort of a machine. The control valve is of the balanced piston type and has a cap which can be unbolted and removed without removing the valve body from the pipe line. An account of the latest use of electricity in the clothing establishment is also given.—The Editor.)

NEW COPES REGULATOR

In 1912, the Northern Equipment Company, Erie, Pa., brought out and patented the continuous feed principle of boiler feed control. They showed that water should be fed proportionately to and variably with the load. This gives a variable water level temporarily inversely proportional to the load; it gives a temporarily decreased feed on sudden increase in load, and a temporarily increased feed on sudden decrease in load.

Up to the year 1912 all feeding was intermittent in character and an absolutely constant water level was considered ideal. Now, however, opinion is unanimous with regard to correct feeding and authorities agree that the so-called "Copes Method" is correct in principle.

Since the introduction of this mechanical regulator changes have been made from time to time in the details of construction, the principle of feeding in the meantime remaining the same.

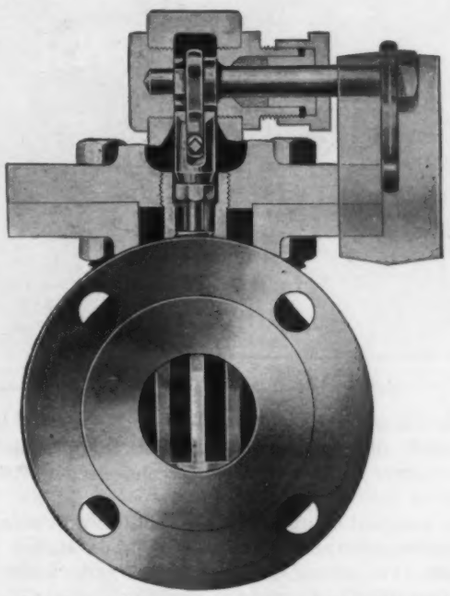


Fig. 1. Vertical section through the valve, displaying the horizontal shaft, the stuffing box, and the link work connecting the shaft with the piston valve.

In the new Copes control valve the reciprocating stuffing boxes have been abandoned, and in their place we have a horizontal shaft which rotates very slightly, performing the same function as the old reciprocating rod. Naturally, this new design is very sensitive. The frictional resistance has been reduced as much as 6 to 16 pounds. It is now practically zero because the shaft rotates very slightly and the same part of the shaft is always in the stuffing box.

The valve is of the balanced piston type. The weight on the valve lever exerts a constant closing force of 50 pounds on the valve piston at all times. A weight is used here rather than a spring because gravity does not vary whereas springs grow weak with age, corrode, stick, break, etc.

Another novel feature is shown in Fig. 2. The valve cap or bonnet can be unbolted and removed with fittings attached as photographed without removing the valve body from the pipe line. Any engineer will appreciate the great advantage inherent in this feature.

Valve fittings can be easily removed and renewed. A monkey wrench or any other kind of a wrench and a piece of flat stock are the only tools required.

The assembled regulator complete consists principally of a heavy expansion tube—the long diagonal tube plainly visible in the illustration. This is known as the "thermostat." It is a straight piece of heavy metallic tubing 1⅛ in. in outside diameter. There is nothing about it to wear out. The top of the thermostat is connected with the steam space of the boiler and the bottom with the water space. Hence there is a water level in the thermostat corresponding with the water level in the boiler. It is this water level in the thermostat that determines the rate of feed. The tube lengthens and shortens with drop and rise of water level. The lengthening and shortening are caused by change in temperature of the tube as the water rises and falls. This expansion or contraction is amplified by means of the link work, and through the link work operates the control valves. All parts are simple, strong, heavy and rugged.

Fig. 2. The valve cap or bonnet can be unbolted and removed with fittings attached, without removing the valve body from the pipe line.

NEW APPLICATION OF THEATER LIGHTING EFFECTS

The artistic lighting effects produced in theaters by regulating the intensity of the various colored lights has been adopted by a New York clothing establishment to aid in the display and sale of feminine apparel.

By means of six electric push buttons set flush into the wall of the display room, the salesman can regulate the lighting for any desired color or intensity. This automatic control from push buttons is accomplished by using three lighting circuits, the lights of each circuit representing one of the three primary colors. It is evident that any color in the solar spectrum can be produced by the proper blending of these three colors. The brightening and dimming of each color is produced by three Cutler-Hammer dimmer plates, operated independently by an electric motor, one plate being provided in each of the three color circuits.

Placed under each dimmer plate are a pair of electromagnets, the coil of each magnet being connected to one of the push buttons. An armature, which normally hangs free between the magnets of each pair, moves forward or back-

The man whose creditor stands behind him looks forward—the entire West is looking forward to the spring conventions —

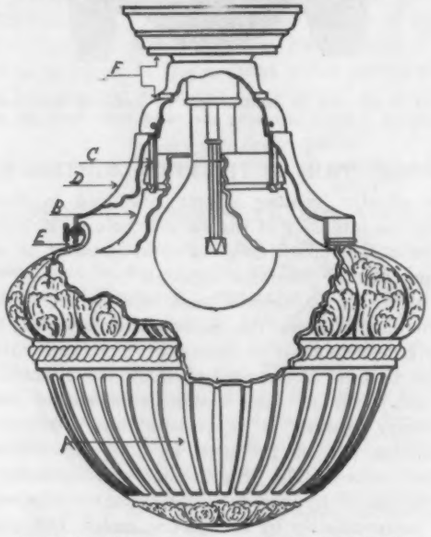
PASADENA — MAY 17-21, 1920

ward when attracted by either magnet. This movement of the armature closes a switch and starts a small motor, which is geared to a driving shaft running the length of the dimmer bank. The attraction of the armature to one of the magnets also causes a rack to engage with a pinion on the driving shaft, thereby transmitting the rotating motion of the shaft to the dimmer arm, and brightening the lamps of that color circuit. The energizing of the other magnet by depressing the other push button attracts the armature in the other direction and engages the shaft pinion with a rack parallel to the first, and which revolves the dimmer arm in the other direction, thereby cutting in resistance and dimming the lamps. The lamps of any circuit increase or decrease in brightness only while the "bright" or "dim" button of that circuit is depressed. Upon releasing the button the light remains stationary. Two magnets, an armature, two parallel racks and a pinion on the driving shaft are provided for each dimmer plate. The rate of dimming allows about twenty seconds to dim the lamps of any color from full "on" to "out."

The importance of showing a garment with the proper color setting is fully recognized by clothing salesmen, the color desired depending on the color and character of the goods of which the gown or suit is composed. This dimmer bank is proving itself a valuable addition to the sales force, and at the same time does not increase the duties of the salesman, who has the complete control of color at his finger tips.

A NEW LIGHTING UNIT

The "Supreme" Reflectolyte, manufactured by the St. Louis Reflectolyte Company, has a number of new and valuable features, illustrated in the sectional drawing below: the translucent blown glass urn (A), of surface ornamentation in Classic and Gothic periods; the bell-shaped metal holder or body (D) supports the urn and completes its graceful outline; the concealed steel reflector (B), with its white porcelain-enameled reflecting surface fused on at a temperature which melts glass, utilizes the horizontal and upwardly inclined rays, redirecting them outwardly and downwardly; the



The new and valuable features of the "Supreme" Reflectolyte are clearly shown in this cross-section drawing.

spring fingers (C) support the porcelain-enameled reflector in a fixed position with relation to the lamp filament and the bowl, and permit instant removal and replacement.

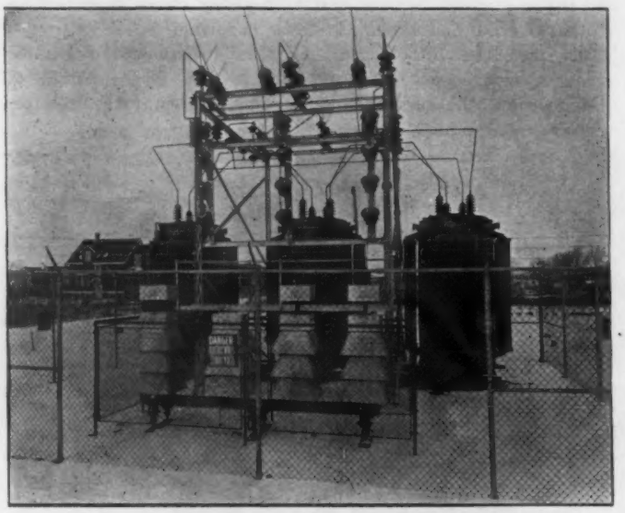
A very interesting feature is the system of ventilation. The cool air enters at the junction (E) of the urn and the metal holder, rises between the body (D) and the non-reflecting surface of the reflector (B) and passes out at "F." Thus it will be seen that any dust or dirt entering the reflectolyte will not be deposited either on the inner surface of the urn, on the reflecting surface of the reflector, or on the lamp itself. At the same time ample ventilation is provided.

Another interesting feature is the position of the filament of the lamp, which is not in the center of the urn, as is usually the case, but is positioned high up on a horizontal plane with the lower edge of the reflector and the upper portion of the urn. This unusual arrangement accounts for this lighting unit's superior efficiency, as well as its beautiful appearance when lighted.

UNIT TYPE OUT-DOOR SUBSTATIONS

A new form of unit type standard substation for capacities up to 5000 kva. and 33,000 volts is being manufactured by the Delta-Star Electric Company, Chicago, Illinois. The expanded steel sections are so arranged that the center transformer can easily be removed if necessary.

The three pole air break switches, choke coils, fuse mountings and bus-bar supports are all of the unit type form, and easily clamped to the galvanized steel framework. The switches are operated from ground level and can be securely locked in either open or closed position.



Unit type substation especially designed for outdoor installation

Space is provided and provision made for the installation of oxide film arresters, connection being made to the lower insulators of the combined disconnecting switches and fuses.

The sectional or unit type assembly is well adapted for large outdoor substations and a 35,000-kw. station is now being built. The advantage of unit type parts which can be quickly assembled in the field is obvious.

NEW MAGNETICALLY OPERATED SWITCH

Magnetically operated main line switches on alternating current light and power circuits are at times slow and unreliable in closing when a solenoid and plunger must be depended upon for their operation. If the plunger is slightly out of adjustment, its movement becomes jerky and noisy, its sealing pull is diminished, and it does not seat properly.

The Cutler-Hammer Manufacturing Company of Milwaukee, Wis., has developed a new oil-immersed magnetic contractor, operated by a clapper type magnet, which makes possible a more rigid mechanical structure and greater reliability in operation than is obtained in contactors of the solenoid and plunger type. This contactor has a capacity of 100 amperes at 2200 volts, and is particularly desirable as a main line switch for an automatic 2200-volt motor starter, or for the remote control of any 2200-volt light or power circuit. It is built with three poles, unless used with an auto-transformer starter, when five poles are provided.

Book and Bulletins

Industrial Lighting

The Benjamin Electric Manufacturing Company has published a book on Industrial Lighting that embodies much practical information for applying the principles laid down by illuminating engineers as the best practice in the lighting of buildings and areas devoted to industrial uses.

The book has been prepared to be helpful to anyone whose objective is the attainment of correct industrial lighting. There has been a general movement in this field to raise standards of production, reduce accidents and spoilage, and to make the task of the worker more acceptable through the application of higher lighting intensities.

The considerations governing the selection of lamps and reflectors are explained in simple terms. There is a chapter on general illuminating information, with tables and definitions which reduce to simple terms the complex formulæ out of which correct deductions with regard to the specification of lamps and fixtures are resolved. There is a table giving the foot candle intensities desirable as worked out from a consensus of the best opinions of illuminating engineers and physicists, and a complete presentation of the electrical symbols used on architects' drawings.

A feature of unusual interest is the charts of industrial fixtures which present a study of reflector contour, light distribution diagram and lamp so that the specification for any particular use is easily arrived at without recourse to any data other than that given in this book.

Numerous examples of industrial lighting requirements, with actual photographic reproductions of results, add greatly to the usefulness of this very practical book on industrial lighting.

The George Cutler Company is issuing a bulletin which illustrates and lists the new line of series and multiple street-hoods which they are introducing. These street-hoods are radical departures in design from previous styles.

Bureau of Standards

Recent scientific papers published by the Bureau of Standards are as follows:

No. 343: "Location of Flaws in Rifle-Barrel Steel by Magnetic Analysis," by R. L. Sanford and William B. Kouwenhoven.

No. 349: "Photoelectric Spectrophotometry by the Mill method," by K. S. Gibson.

No. 351: "Dependence of the Input Impedance of a Three-Electrode Vacuum Tube Upon the Load in the Plate Circuit," by John M. Miller. Because of the capacities between the electrodes of a three-electrode vacuum tube, the input impedance, which determines the input voltage supplied to the grid of the tube by the apparatus in the input circuit, depends upon the electrical characteristics of the plate or output circuit. In this paper theoretical relations are established which permit the input impedance to be calculated when the impedance in the plate circuit is known.

Electric Cranes

Two interesting booklets on electric cranes have recently been sent out by the Toledo Bridge & Crane Company of Toledo, Ohio. Of these Bulletin 21 presents a long list of users of the Toledo cranes, together with letters and photographs descriptive of the service they are rendering.

Railway Substation Economies

Under the above title the General Electric Company of Schenectady publishes an attractive illustrated booklet describing automatic substation apparatus and its advantages. The booklet consists mainly of excellent photographs of automatic substations in many different parts of the country.

Opportunities for Technical Graduates

Westinghouse opportunities for technical graduates are very thoroughly explained in an illustrated pamphlet bearing that title, recently issued by the Westinghouse Electric & Manufacturing Company.

This booklet describes, in considerable detail, the plan which has been developed by this company for the training of the graduates of technical schools at all of its various works. In the booklet is included a list of prominent Westinghouse men who originally entered the company as graduate students, as well as a complete list of schools from which over 5,000 students have entered the employ of the company.

Copies of the booklet will be sent to anyone interested on application to the educational department of the company at East Pittsburgh.

University Publications

The recently organized Engineering Experiment Station of Purdue University, Lafayette, Indiana, has published a bulletin entitled "Electric Ranges," which presents the characteristics of the different types of electric ranges as well as data on the cost of baking with electricity.

The University of Illinois Engineering Experiment Station is publishing a series of bulletins on warm-air furnace research. The first of this series, Bulletin No. 112, is entitled "Report of Progress in Warm-Air Furnace Research."

Bulletin No. 316, from the University of California Agricultural Experiment Station, is I. J. Condit's "The Kaki or Oriental Persimmon." Bulletin No. 317 is H. I. Webber's "Selection of Stocks in Citrus Propagation." Circular No. 216 is an account by T. D. Batchelor and H. S. Reed, of studies made through several seasons on the so-called Persian walnut. Stanley S. Rogers presents an interesting report: "Methods for Marketing Vegetables in California," in Circular No. 217.

Miscellaneous

A large size booklet recently sent out by the General Gas Light Company of Kalamazoo, Mich., illustrates the newspaper cuts which the company has available for advertising the Humphrey Radiantfire. A large colored advertising card has also been sent out.

A booklet describing the Nordstrom Lubricated Plug Valve has been issued by the Merrill Company of San Francisco.

"Beldenmold" is the title of a small but informative bulletin on synthetic molded insulation, prepared by the Belden Manufacturing Company of Chicago.

A recent Westinghouse booklet of distinct value and interest deals with the Westinghouse underfeed stoker. It is very fully illustrated.

"Fuel Oil and Its Use," is the title of a Tate-Jones Company booklet which contains pictures and illustrations of various types of oil burners.

The Diesel engine is thoroughly described and illustrated both internally and externally in a recent booklet published by the Allis-Chalmers Manufacturing Company.

Revised and enlarged Bulletin No. 112-B entitled, "Condensers, Pumps, Cooling Towers, Etc.," has just been published by the Wheeler Condenser & Engineering Company, Carteret, New Jersey. This bulletin illustrates the latest developments in condenser practice.

Postage stamps in hot weather often stick together—the West must stand together if it is to tell its story properly to Eastern visitors —

PASADENA — MAY 17-21, 1920

NEW ELECTRICAL DEVELOPMENT

(The Northwest reports that a bid for the construction of a railway to the Skagit river plant site is being considered. Numerous applications have been filed for construction of big dams and power plants in both the Pacific Central and Southwest districts. Power companies in Idaho and Utah are applying for rate increase.—The Editor.)

THE PACIFIC NORTHWEST

CENTRALIA, WASH.—Ground has been broken for the electric plant of the Sherman County Light & Power Company.

TACOMA, WASH.—The Tacoma Railway & Power Company has purchased six additional one-man cars from the American Car Company of St. Louis, same to be equipped throughout with Westinghouse equipment.

SALEM, ORE.—The construction of a power house will be started by the Enterprise Electric Company as soon as their application for appropriation of water from the Wallowa river has been granted. The plant will cost about $150,000.

PORTLAND, ORE.—The State Engineer has received, since the first of January, twenty-one applications to appropriate water for power developments. This totals 600,000 horsepower which is three and one-half times the amount previously developed in the state.

KLAMATH FALLS, ORE.—An election will be held at Merrell, April 1, on the question of creating a new irrigation district, to be called the Patterson district, and to select three directors. The county court has confirmed steps taken so far to create the new district.

SEATTLE, WASH.—An engineering report on a five-mile project for redeeming land in Franklin and Walla Walla counties has been filed with the state reclamation board. One hundred thousand acres of land are under consideration and 30,000 horsepower will be developed.

CORVALLIS, ORE.—Professor T. A. Teeter, of Irrigation and Hydraulics at Oregon Agricultural College, says that a water shortage, resulting from lack of rain last month, threatens the state. He warns users of storage water to be careful and says that irrigation managers should plan field moisture and stop every leak in the system.

SEATTLE, WASH.—In response to the city's calls for figures from contractors for the construction of the 22 miles of railroad from Rockport up the Skagit river to the vicinity of the Skagit power plant site, the Grant-Smith Company submitted the only bid received by the board of public works, which contained the proposal to construct the railroad for the sum of approximately $600,000. C. F. Uhden, hydro-electric engineer in charge of the Skagit project, states that he considers this figure too high for the undertaking projected. The matter will be disposed of shortly.

THE PACIFIC CENTRAL DISTRICT

VALLEJO, CAL.—It is learned that the Pacific Gas & Electric Company will erect a modern office building on the old Martin property in the 400 block on Virginia street, Vallejo. Construction is to start at an early date.

SACRAMENTO, CAL.—Rindge Land Reclamation District has sold $1,201,500 5½s to the Rindge Land Navigation Company at par. The Contra Costa County Bank has bought $50,000 of a block of $440,000 5s, City of Pittsburgh Municipal Improvement.

TULARE, CAL.—The problem of an auxiliary pumping plant for the west side was brought up here recently by the representative of a pump company. The trustees decided that as soon as possible bids would be called for the putting down of a well and the installation of pumps.

SACRAMENTO, CAL.—The state reclamation board approved plans of District 2021 in San Joaquin county for completing its work in the Merced Island district. New drainage canals and pumping facilities will cost upward of $300,000.

FRESNO, CAL.—The State Engineer has written to the board of supervisors requesting full information on the project for the formation of the Fresno irrigation district, which came before the board through a petition on March 1.

PARADISE, CAL.—The Paradise district is assured an up-to-date telephone system as a result of forty families signing up for the proposed service. The committee in charge announces that the new system should be in operation within ninety days.

MARYSVILLE, CAL.—At an election of landowners held here the Glenn-Colusa Irrigation District was organized. The district embraces 103,000 acres of land on the west side of the Sacramento Valley in Glenn and Colusa counties. An election to decide upon bonds will soon be called, the secretary stated.

SAN FRANCISCO, CAL.—Out of 803 applications to the California Railroad Commission only 57 concerned electric companies. Of 168 applications to increase rates, 21 were filed by electric companies. During the year the Commission rendered 943 decisions, the second largest number in its history.

LOS BANOS, CAL.—The San Joaquin and Kings River Canal and Irrigation Company (Miller & Lux) has mailed out circular letters to its patrons attacking the proposed formation of the West San Joaquin Irrigation District, and threatening to raise its water rates if the district is formed.

ALTURAS, CAL.—An election has been called by the board of directors of the Hot Spring Valley Irrigation District of Modoc county, recently organized in this county, to determine whether the district will issue $100,000 worth of bonds. The money is desired to construct necessary reservoirs, canals, etc., for irrigating the country embraced in that district.

SACRAMENTO, CAL.—Application of the Crooks Irrigation District in Modoc county for approval of its plans to bond the district in the amount of $80,000 for improvements, has been approved by the State Irrigation District Bond Company. The district was organized in 1919, and comprises approximately 6000 acres of land.

SAN FRANCISCO, CAL.—A supplemental order issued by the Railroad Commission amends the lease under which the Pacific Gas & Electric Company took over the properties of the Sierra and San Francisco Power Company to the extent that it fixes March 31, 1920, as the time limit of the time allowed for fixing upon the values of certain of the properties involved.

SAN RAFAEL, CAL.—Mayor George F. Rodden signed a deed conveying to the United States Government the right-of-way for widening and deepening the San Rafael canal, leading from San Rafael to San Francisco Bay. San Rafael's special tax of $14,800, a part of the fund of $54,600 to be expended on the improvement, was made available for the use of the Government engineers under whose supervision the work will be done. The federal appropriation for the work was $27,300 and the state supplied $12,500.

REDDING, CAL.—The Happy Valley Irrigation District will sell $100,000 worth of bonds at its office in Olinda on March 15, to raise money to complete the construction of the Messelbeck dam, to finish digging the Hoover tunnel and for enlarging and extending its canals. The bonds bear 6 per cent interest and run from date over varying periods to 1939 and 1958. The district was bonded originally for $65,000. The coming sale will be made from bonds held in the treasury.

SACRAMENTO, CAL.—Declaring the Iron Canyon Project is the salvation of the Sacramento Valley, and the means by which water can be stored properly for use in the summer months, Commissioner D. W. Carmichael urged the city commission to take a stand for this project, and "start a fight, if necessary, against the arbitrary and dictatorial policy of power companies."

AUBURN, CAL.—A 150,000 mortgage has been filed in the office of the county recorder, whereby the North Fork Ditch Company, operating in Placer and Sacramento counties, gives a mortgage to the C. W. Clark Company. The time is three years and the rate of interest 6 per cent. The North Fork Ditch Company claims 3000 inches of water from the North Fork of the Sacramento river and 20,000 inches from the North Fork of the North Fork.

SACRAMENTO, CAL.—Bonds in the amount of $4,952,986.76, issued as a lien against lands in Reclamation District No. 1500, in the Sutter Basin, were on sale at the Yuba City, Sutter county courthouse on Saturday, March 13. The bonds bear 6 per cent interest and are to be paid in twenty years. The amount to be produced by the sale of the bonds already has been expended in construction work in the district.

MARTINEZ, CAL.—Boring a well in the hope that he would find a supply of water for farm use, Michael Cavich, a farmer near here, uncovered a water gusher of a daily capacity of 72,000 gallons. An investigation is to be made by the town trustees for the purpose of determining the availability of this water supply for town purposes.

LAKEPORT, CAL.—The Snow Mountain Water & Power Company has been authorized by the Railroad Commission to issue stock to the extent of $1,500,000, for the purpose of acquiring funds with which to build a dam at the Gravelly Dam site and to improve its power house and service, thereby increasing its service in Lake county by approximately 25 per cent.

SAN RAFAEL, CAL.—Officials of Vallejo, Mare Island and Benicia inspected the properties of the Marin Municipal Water District recently accompanied by representatives of the California Hawaiian Sugar Refinery at Crockett. The latter company has contracted to take 500,000,000 gallons of water annually from the water district. The raising of the height of the Alpine dam seventy-five feet and a pipe line around San Pablo Bay are planned.

RICHMOND, CAL.—City Attorney Frank Cornish of Berkeley and City Attorney D. J. Hall of this city will have a conference and decide on what is to go into the call for the election May 4th for the organization of a public utility district by the two cities. It is planned by the two cities, if the district is formed, to secure its water from the Marin municipal water district. A pipe line is to be laid across the bay from Point San Quentin.

PETALUMA, CAL.—W. Chester has received the deed of the Sonoma Valley Water, Light and Power Company's plant, also the real es-

tate and large holdings in Sonoma Valley from George L. Payne of San Francisco. With the assistance of a number of San Francisco promoters, Chester is planning to greatly improve the plant. The Lewis system will be augmented by the addition of the water rights on the O'Brien ranch in the hills above El Verano, where the water will be caught in the winter and impounded, and the Lennox Creek supply utilized.

CRESCENT CITY, CAL.—Del Norte county is to be opened to settlement and industry by the erection of a breakwater at Crescent City, the outpost of civilization in northwestern California. Government engineers have approved a contract for the building of a $200,000 breakwater a third of a mile long at Crescent City, a small lumber port a short distance north of the Little Klamath river. The people of the community raised the necessary funds for the work, and are expecting Congress to make an appropriation of about $500,000 more to continue the harbor work. When the breakwater is finished, Crescent City folk expect to make their town a great shipping point for timber, tungsten, copper and agricultural products.

TURLOCK, CAL.—A feature of the regular meeting of the directors of Turlock Irrigation District was their presentation of Secretary Sorrenson's annual report, covering all the business transactions of the district during the year 1919. The total receipts from all sources during the year 1919 were $453,495.21. The total disbursements during the same period were $538,454.50. For maintenance there was expended $90,801.61, and for general expense and the like, $28,826.05. The sum of $315,037.33 went for construction and the interest on bonded indebtedness cost the district $130,289.50. The district owns and maintains 244½ miles of distributing canals, of which about 14 miles are concrete-lined. Drainage canals of the district in operation at the first of the year measure up 58 miles.

SACRAMENTO, CAL.—In compliance with requirements of an order issued by the Railroad Commission, the Sespe Light and Power Company has filed with the Commission a description of its plans for financing the construction of electric power plants and irrigation systems on the Sespe and Piru rivers in Ventura county. The company proposes to issue $3,000,000 of its first mortgage bonds and $1,000,000 of its capital stock. It is estimated that the total cost of constructing the four dams, three conduits and three power plants constituting the first unit of the company's proposed development, will total over $4,030,000. The plans of the company contemplate the wholesaling of power to the Southern California Edison Company. Wholesaling of water for irrigation purposes after it has been used for power development is also planned.

MODESTO, CAL.—Having carried the election for $2,000,000 bonds by a ten to one vote, the directors of the Modesto Irrigation District will proceed now to sell the issue and join Turlock in building the Don Pedro reservoir and power plant in the upper Tuolumne river. The total cost of the enterprise will be over $5,000,000. Turlock district has already voted favorably on the proposition. The plan is to start work on the dam by April. It will be necessary to build a ten-mile railroad to haul materials for construction either from Crouch Camp or Coopertown on the Sierra Railroad. Two years and a half will be required to complete the project. When finished, it will amplify the present water supply for the Modesto and Turlock irrigation districts and permit irrigation throughout the year. About a half million of the money will be used in extending and perfecting the drainage systems of the two districts.

SACRAMENTO, CAL.—Sweeping recommendations looking to the conservation of water in California were made by the various state and federal irrigation and power agencies in the state, in an exhaustive report on the water conditions for the coming season read by Governor William D. Stephens before the Sacramento Valley Water and Irrigation Congress, which opened a three-day convention in the senate chamber at the Capitol. The report, which is in the form of a notice to all water companies, irrigation districts and water users in California, was prepared by the state and federal agencies at the request of Governor Stephens. In the report recommendation is made that farmers proposing to put new land under cultivation this year defer such action; that rice land that has become fouled or partially fouled, be rested during the present season; that irrigation companies decrease wherever possible the area irrigated; that up-to-date methods be used to retain moisture in the ground; that all wells be capped and that long-lived crops, especially orchards, should be cared for so they may not be destroyed for want of water.

BISHOP, CAL.—By its purchase of the Mono Power Company property the Southern Sierras Power Company acquired title to section 16, township 5, range 31, through the eastern half of which runs the gorge of Owens river. If evidence of the purchasers' intentions were needed, it is being supplied by the energetic way in which development work has begun. Fifty men are working and more are being added as fast as they are secured. A total investment of more than $2,000,000 is contemplated by the company's plans. The largest of the series of three, or possibly four, plants will have a capacity larger than all that are now operating on Bishop creek. The first will be completed and in service this year. It will be 3300-horsepower and will be located about three-fourths of a mile up the river from the upper Mono camp. A second plant will be located not far from the foot of the grade into the canyon. The greatest work of all will be located still farther down the river. An official statement from the Riverside office is that this plant will be of capacity enough to utilize the entire normal flow of the river; that it will produce 27,000 horsepower, and that its cost will be $2,000,000. Work has begun on the transmission line to tie the new plants into the general Southern Sierras system.

THE PACIFIC SOUTHWEST

PHOENIX, ARIZ.—A contract has been signed with the Foundation Company of New York, for construction of the Gillespie dam.

MESA, ARIZ.—Sixteen hundred feet of the Consolidated Canal has been washed out and destroyed, in the Lehi district and on the Mesa side of the river.

LONG BEACH, CAL.—Plans are under way for widening and deepening the Long Beach harbor enough to accommodate the largest vessels in the Pacific.

SEELEY, CAL.—It is reported that directors of the irrigation district will take steps toward calling a bond election for construction of the whole or a portion of the All American Canal.

VENTURA, CAL.—Residents of the Conejo district have made application to the State Irrigating Board with regard to irrigation for that district. Water is greatly needed in that section.

LOS ANGELES, CAL.—The bid of the City Railway Company, which is a franchise-holding company for the Los Angeles Railway Company, for street railway along Broadway from Tenth to Pico streets, has been accepted by the city council.

LOS ANGELES, CAL.—The Southern California Edison Company has filed a supplemental order with the Railroad Commission asking authority to withdraw from a special fund created by the sales of bonds, the sum of $630,309.34. The money is to be used to reimburse the company for capital expenditures.

LOS ANGELES, CAL.—The Southern California Edison Company have announced that bids have been requested for a 30,000-kilowatt horizontal steam turbine for installation in their Long Beach plant, the machine to be ready for operation by the spring of 1921. The Long Beach steam plant of the Southern California Edison Company has at present three vertical shaft turbines installed in it of capacities 12,000, 15,000 and 20,000-kva., respectively.

GLOBE, ARIZ.—The Inspiration Consolidated Copper Company, with offices in this city, is starting the construction for another turbo driven generator of larger capacity than any it now has in operation. If a leaching plant is built, still another generator may be installed. The Inspiration Consolidated Copper Company is one of the largest mining companies in the country, having a 12,000-kw. load; a generating plant consisting of three 6,000-kw., 6,600-volt, 25-cycle machines. The company is also connected with the Roosevelt dam hydro-stations. The turbines are largely driven by steam generated at the smelter by using the waste heat from the furnaces, in boiling at that point, and is carried by headers to the power house.

THE INTER-MOUNTAIN DISTRICT

PERRY, UTAH.—The Perry Electric Light & Power Company has applied to the Public Utilities Commission for permission to increase its rates to the people of this community.

SODA SPRINGS, IDA.—The Utah Power & Light Company has applied to the Public Utilities Commission to enter into a franchise with Caribou county for the building of transmission lines through the county.

PROVO, UTAH.—The mayor of this city has been authorized to contract with the Provo Foundry & Machine Company for the abandonment of its water power site on West Center street, which will be taken over by the city.

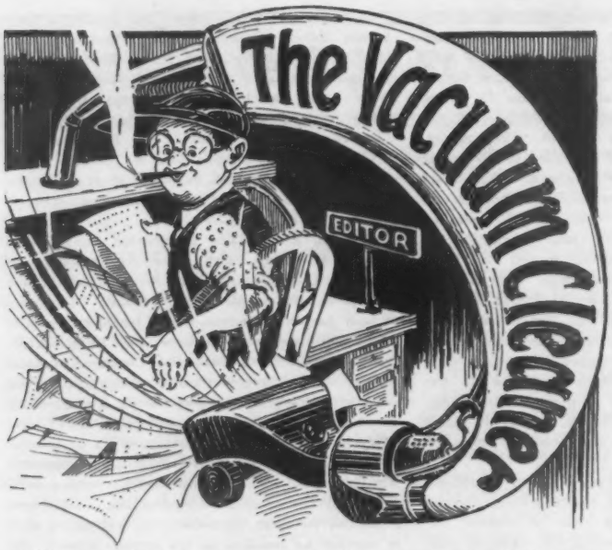
BRIGHAM CITY, UTAH.—The city council of this city has decided that it cannot continue to supply electric current to the Perry Power & Light Company for resale purposes after May 1. It requires all power for the use of the municipality itself.

SALT LAKE CITY, UTAH.—The City Commission has increased its budget for street lighting for 1920 over any previous year to take care of improvements and additions. Salt Lake City is already considered one of the best lighted cities in the entire United States.

BOISE, IDA.—The Idaho Power Company has filed its new rates with the Utilities Commission, announcing that they are to go into effect April 1. The increase has been the subject of some discussion and the Utilities Commission has issued an order suspending the rates as proposed in the new schedule until a full investigation can be made, or for 120 days after March 31.

BOISE, IDA.—The city of Idaho Falls, which operates a municipal lighting plant, has protested the right of the Public Utilities Commission to fix the rates to be charged by the Utah Power & Light Company for standby service, claiming that this power rests with the municipality. The city plant was unable to furnish maximum power requirements some months ago when connection was made with the Utah Power system.

SALT LAKE CITY, UTAH.—Hearing on the application for an increase in power rates by the Utah Power & Light Company commenced before the Public Utilities Commission on March 4. The company claims a deficit at present ranging between two million and five million dollars, which amount will be required to enable the company to set aside an adequate depreciation fund and pay return on money invested, which amounts to approximately $32,000,000 for property located in the state of Utah.



Selling stock to customers is the moral of a little story recently told by A. E. Wishon of the San Joaquin Light & Power Coupany. The company had been ordered to put a fish ladder on the Merced river, and representatives went up to present the case showing that such a course was unnecessary as the company was losing water and had very little to lose by that dam. While the hearing was in progress an old fellow came into the room, ranged himself beside the company's counsel, and proceeded to give him all the information about the history of all the salmon fishing that had ever been done in that river. As he knew more about local history than the company could have found out in a year the case was greatly strengthened and the order set aside.

Afterwards counsel for the company thanked the old man for his help and asked him why he gave it.

"Well," said the man, "I'm a stockholder in your company."

"You are?"

"Yes, I own three shares of the P. G. & E. stock."

"But this is not the P. G. & E. Company," explained the lawyer.

"Th' hell it ain't!" exclaimed his erstwhile helper.

It's a wise stockholder who knows his own company. But that doesn't affect the moral we started out with.

* * *

Hope springs eternal in the human breast. We hear that the prize in a recent electrical golf tournament was a silver cocktail cup.

"NOW YOU GET BUSY AND SWEEP THOSE ASHES UP"
"I DON'T OBJECT TO SMOKING IN THE HOUSE - IN FACT I WANT YOU TO SUGGEST A GIFT FROM ME —
—TO COMPLETE YOUR SMOKING OUTFIT ????"
AN ELECTRIC VACUMM CLEANER

Some men are born with electrical appliance appreciation and some must have it thrust upon them. Dad had never been an enthusiast on the "electrical home" idea but evidently his mind changed with remarkable abruptness after a five minutes seance with the broom.

Speaking of accidents, perhaps the insurance companies are a little too general in their interpretation of the word.

An insurance man was putting questions to a former cowboy, as he wrote out his application.
"Ever had any accidents?"
"No," was the reply.
"Never had any accident in your life?"
"Nope. A rattler bit me once, though."
"Well, don't you call that an accident?"
"Hell, no. He bit me on purpose."

* * *

Just for a change we reproduce the following compilation of business virtues as an antidote to the demoralizing flippancy of this page:

Don't trouble your superior with matters which are trivial.
Settle them yourself, thereby showing you are big enough to take care of them.
The man above you wants a man whom he can depend upon to handle small matters which otherwise might come before him, and he is going to look around till he finds the right man—so if you can not meet the requirements, some one else gets the job.
The high priced man is not in that position to handle small details.
The firm could not afford to pay him for such service, and he has not the time to give to the little matters if he takes care of the larger ones.
The man who troubles him too much with unimportant matters which should not be required of him is due to be dropped when a man with more ability and initiative is found.
Learn to rely on yourself to get out of the little difficulties which arise in your department.

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Helpful Hints for the Meter Man—No. 2.

The meter man who finds his Style Plus suit in hopeless condition after making his tour will welcome this idea. The meter should be attached to a spring so that it can be pulled to the reader's very eye by a simple twist of the cane. The overworked condition of meter men has been attributed to the habitual placing of meters in dark nooks and unattainable crannies. It is hoped that this spring attachment plan will ultimately do away with the difficulty.

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Salesmanship is an art rather than an exact science,—you never know just what hard facts you will have to contend with. For instance, there was a salesman who leaned confidentially against the door post, produced a new patented device from his bag and opened fire on the housewife as follows:

"I have here a combined paper-cutter, can-opener, corkscrew, button-hook, ——"

"Thank you," said the lady, "I have plenty of hairpins," and closed the door firmly in his face.

More successful was the patent medicine man trying to convert the cranky bachelor. Said the bachelor:

"I don't believe in all this patent medicine. New-fangled nonsense, that's what it is. Our ancestors never had any of the stuff."

"And where are they now?" retorted the salesman, triumphantly. "Dead, every one of 'em."